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PRACTICAL RESULTS OF BACTERIOLOGICAL RESEARCHES.[1]

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Science does not demand practical results, but investigates for the purpose of establishing facts and explaining phenomena; and bacteriology as a branch of natural history is entitled to equal consideration with other departments of scientific research. Indeed, the low organisms known as bacteria offer many advantages for the study of fundamental biological problems; and the researches already made have borne abundant fruit from a scientific point of view.

But Medicine is eminently practical in its aims, and practising physicians, as well as intelligent laymen, are apt to meet every announcement of a new discovery in pathology with the question: "Does it aid in the cure of disease?" Heretofore the bacteriologist has been compelled to admit that the demonstration of the specific cause in a considerable number of infectious diseases, which has been obtained through his researches, has not resulted in the discovery of a specific treatment for these diseases. At the present moment we are in possession of experimental data which open up to us a vista of possibilities in specific treatment unsuspected a year or two ago. We shall presently give a somewhat detailed account of the experimental data referred to, and will indulge in some speculation as to the practical results which are likely to follow this remarkable addition to our knowledge.

The title of my paper calls also for some reference to practical results of another kind, viz., in the prevention of disease.

[1] Read before the Association of American Physicians, at Washington, May 24, 1892.

Without doubt, preventive medicine—or "sanitary science," as it is sometimes called—has been immensely benefited by the researches of bacteriologists. It is true that sanitarians had obtained, by observation and empirical methods, important data upon which to found their recommendations before we had any knowledge of pathogenic bacteria. But it is also true that in the absence of this knowledge their recommendations were often inadequate and contradictory, and were without the authority which comes from an exact experimental basis.

In practical disinfection, for example, agents were often employed which have since been shown to have but little value, or agents of value were employed in inadequate amounts. Again, in the absence of any precise knowledge of the nature of the infectious agent, or of its special habitat, the sanitarian often devoted himself to the destruction of imaginary germs in the air, and failed to attack pathogenic bacteria in the sputa of patients with pulmonary tuberculosis and in the excreta of those with typhoid fever.

To-day we have an exact knowledge of the usual habitat and of the biological characters of a considerable list of pathogenic bacteria; and this knowledge enables us to formulate recommendations which, if carried out, would doubtless go far toward eradicating the diseases induced in man, and in the lower animals, by these infecting agents. For example, the demonstration that tuberculosis is an infectious disease due to a bacterial parasite—the bacillus tuberculosis—at once leads to the recommendation that this bacillus be destroyed wherever it may be found external to the bodies of infected individuals. The fact that it is present in the sputa of patients suffering from pulmonary tuberculosis, in the milk of tuberculous cows, and in the tissues of tuberculous animals, leads to the more specific recommendations that the sputa of tuberculous patients should be disinfected; that cow's milk from an unknown source should be sterilized before it is used as food; and that the flesh of tuberculous animals should not be used as food. Finally, our knowledge of the action of numerous disinfecting agents, as tested upon this bacillus, enables us to give specific directions as to its destruction; and, as we have experimental evidence showing that the tubercle bacillus is quickly destroyed by the boiling temperature, we may permit the use of milk from an unknown source after it has been boiled.

Again, we may point to the present position of aseptic surgery and midwifery. In the absence of precise knowledge relating to the microorganisms concerned in traumatic infections, Lister devised his spray apparatus for destroying pyogenic bacteria in the air during an operation. We know now, as the result of carefully conducted experiments, that this was an unnecessary precaution, and that it would not have been efficient if the microörganisms to be destroyed had been present in the air in considerable numbers, as was imagined by the illustrious originator

of antiseptic surgery. And, having learned that the great danger of infection results from the transfer of pathogenic bacteria to wound surfaces by the hands or instruments of the surgeon or his assistants; that pyogenic bacteria are found on the surface of the body and of the mucous membranes in healthy persons; and that sterilization of the hands of the surgeon or of the surface through which his incisions are to be made can be effected by certain procedures, which have been elaborated by the experimental method, aseptic surgery takes its place as a rational method founded upon scientific observations. Thus prevention of infection becomes the first duty of the surgeon and of the obstetrician, as well as of the physician and sanitary official. And the necessity for treating infected wounds, puerperal septicæmia, or local epidemics of infectious diseases, in the light of our present knowledge, is a reproach which attaches to some individual or corporation.

But scientific men are so familiar with the practical results of bacteriological studies, so far as preventive medicine is concerned, that it is unnecessary to insist upon this point. Nor need I do more than advert to the considerable success attending the use of antiseptics in traumatic infections, and in localized infectious processes, when these are accessible to local treatment.

Among the practical results of bacteriological researches we may mention the early diagnosis of certain infectious diseases by methods which serve to demonstrate the presence of the specific infectious agent. Thus the presence of the tubercle bacillus in material coughed up from the lungs is now generally accepted as evidence of pulmonary tuberculosis, although this may not be revealed by the usual physical examination. In diphtheria, where the diagnosis is uncertain, a microscopical examination of the exudate, together with culture experiments made by an expert bacteriologist, may settle the question. In suspected cases of glanders in horses the diagnosis may be established by inoculating a guinea-pig with pus from a suppurating gland, as recommended by Löffler. And in tuberculous cows an early diagnosis may be made by injecting into the suspected animal from 30 to 40 centigrammes of Koch's tuberculin. If the animal is tuberculous a decided febrile reaction occurs in from twelve to fifteen hours; and this is even more marked in early cases, in which the diagnosis by other methods is most difficult, than in advanced cases. The reliability of this test has been demonstrated by extended experiments made, for the most part, by veterinary surgeons in various parts of Europe.

Here we might stop a moment to refer to the practical results which have been obtained in France, and elsewhere, in protecting domestic animals from certain infectious diseases to which they are subject by Pasteur's method of inoculation with an attenuated virus. But it is our intention to limit the scope of this paper to human pathology. The

inoculations made to prevent the development of hydrophobia in persons bitten by rabid animals, however, require brief mention. For, although the specific infectious agent in rabies has not been demonstrated, and the inoculations made do not involve the use of bacteriological methods, the discovery of their prophylactic value is a result of preceding bacteriological researches.

We give below two tables,[1] one showing the results of inoculations made at the Pasteur Institute in Paris during five years—1886 to 1890 inclusive, the other a classified statement showing the results in a single year—1890.

	No. treated.	Died.	Mortality.
1886	2671	25	0.94 per cent.
1887	1770	13	0.73 "
1888	1622	9	0.55 "
1889	1830	6	0.33 "
1890	1540	5	0.32 "
Total	9433	58	av. 0.61 "

In the following table A includes all persons treated who had been bitten by an animal proved to be rabid, B persons bitten by animals examined by veterinary surgeons and pronounced rabid, C persons bitten by animals suspected of being rabid. The figures relate to the year 1890:

	No. treated.	Died.	Mortality.
A	416	0	0
B	909	4	0.44 per cent.
C	215	1	0.46 "

But, as announced at the outset, the principal object of the present paper is to bring to your attention certain recent researches which lead to the hope that we are on the eve of a new departure in the specific treatment of infectious diseases.

As is well known to members of the profession, the researches of bacteriologists have established the fact that the pathogenic action of those bacteria which have been shown to be concerned in the etiology of specific infectious diseases is due to the formation of toxic products during the active development of the bacterial cells. The discovery of these toxines and toxalbumins has led to a line of research work, the object of which is to isolate and study each of these toxic products separately by the methods of chemistry and of experimental pathology.

In the course of these experiments, and of the extended researches which have been made with reference to the explanation of natural and acquired immunity, the remarkable discoveries which will occupy our special attention have been made.

[1] From the Annales of the Pasteur Institute, vol. v. pp. 345, 346.

The discovery of the "anti-toxines" is so recent, and the facts relating to their specific antidotal power so unexpected, that I may be permitted to go into some detail with reference to the experimental data which form the basis of our present knowledge.

The demonstration by Nuttall, Buchner, and others, that the blood-serum of certain animals possesses decided germicidal power, led to researches with reference to the nature of the particular substance to which this action is due. Buchner[1] showed that it does not depend upon the cellular elements of the blood, and inferred from his experiments that it must be an albuminoid body. The researches of Martin and Hankin[2] confirmed this view. These investigators succeeded in obtaining from the spleen and lymph glands of rats, which animals have a natural immunity against anthrax, a globulin which they believe to be the active germicidal agent in the blood and tissues of these animals. Additional facts of importance were developed by the experiments of Ogata and Jasuhara,[3] who showed that the blood of an immune animal —dog or frog—injected into a susceptible animal—mouse—shortly before or after inoculating it with a virulent culture of the anthrax bacillus, protects the animal from a fatal attack of anthrax, and that after its recovery from the mild attack which results, the animal is immune against the action of virulent cultures. The protective influence is exercised when the blood is injected as long as seventy-two hours before the inoculation, or five hours after, and it is not lost when the blood used for the antidotal injection has been preserved for weeks in a cool place. It is completely destroyed, however, by exposing this blood for an hour to a temperature of 45° C. A single drop of frog's blood sufficed to preserve a mouse from the fatal effects of an anthrax inoculation.

It is evident that these facts, if well established, have immense significance from a therapeutic point of view; but they are so novel and so unexpected, that we might regard the results reported with some scepticism, were it not that they are supported by similar facts obtained in other infectious maladies by independent investigators. First in date and importance are those of Behring and Kitasato,[4] published soon after the results of the above-named Japanese investigators had been made public in a communication to the medical faculty of the Imperial University of Japan, at Tokio.

The experiments of Behring and Kitasato showed that the blood of animals which have an artificial immunity against tetanus, or against diphtheria, when injected into susceptible animals preserves them from fatal infection with virulent cultures of the bacillus of tetanus or of diphtheria. So small a quantity as 0.2 c.c. of blood from an immune

[1] Archiv f. Hygiene, 1890, Bd. x.
[2] Brit. Med. Journ., May 31, 1890.
[3] Centralbl. f. Bakteriol., 1891, Bd. ix. p. 25.
[4] Deutsche med. Wochenschr., 1890, No. 49.

rabbit, injected into the cavity of the abdomen of a mouse, was sufficient to protect it from the fatal effects of a virulent culture of the tetanus bacillus, injected twenty-four hours later. Further, these bacteriologists have shown that the toxic substance—toxalbumin—present in a filtered culture of the tetanus bacillus is neutralized by admixture with the blood of an immune rabbit. A culture, ten days old, was sterilized by filtration; this filtrate was found to kill a mouse with certainty in less than two days when injected into the animal in an extremely minute quantity—0.0001 c.c. Five c.c. of blood-serum from an immune rabbit was added to 1 c.c. of this virulent filtrate. At the end of twenty-four hours four mice received, each, 0.2 c.c. of the mixture, containing more than three hundred times the fatal dose of the filtered culture. All of these mice survived and proved subsequently to be immune for virulent cultures of the tetanus bacillus, while four control mice, each of which was inoculated with 0.001 c.c. of the same filtrate, unmixed with blood, perished within thirty-six hours. The blood of rabbits not immune against tetanus was without result in neutralizing the toxalbumin in filtered tetanus cultures, as was also the blood of children, of calves, sheep, and horses.

Similar results have been obtained by the Italian investigators Tizzoni and Cantani,[1] who have given special attention to the study of the chemical characters of the "tetanus antitoxine," which they have isolated from the blood of immune animals. They arrive at the conclusion that it is a globulin, or a substance carried down by the globulin precipitate, and that it is different from the globulin obtained by Hankin from animals immune against anthrax.

Recently a most important experiment, from the point of view presented in this paper, has been made at Padua with the tetanus antitoxine of Tizzoni and Cantani. This was the successful treatment of a case of traumatic tetanus with tetanus antitoxine prepared by the authors named. The case is reported by Dr. Rudolf Schwarz,[2] assistant to the surgical clinic at Padua.

The patient was a peasant boy, aged fifteen, who wounded himself in the left forearm while attempting to cut a walnut which he had picked up from the ground. There was considerable hemorrhage, which was controlled by the application of a wad of spider's web and a bandage. A return of the hemorrhage induced the parents to take the boy to the surgical clinic at Padua. There, under appropriate treatment, the hemorrhage was arrested and the wound healed. Two weeks after receiving the wound symptoms of tetanus were developed. The patient was admitted to hospital three days later, at which time the jaws were immovable and the muscles of the arm in a state of tetanic rigidity, while other muscles of the trunk and extremities were also involved. Treat-

[1] Centralbl. für Bakteriol., 1891, Bd. x. p. 785.

[2] Ibid., Bd. ix. p. 685.

ment with chloral and warm baths was without effect in arresting the progress of the malady, and on the 16th of September, nine days after admission, the patient had eight or nine tetanic convulsions during the night, accompanied by difficult respiration and slight opisthotonus. No improvement having occurred under the treatment employed, it was decided to test the value of tetanus antitoxine which had been sent for the purpose by Professor Tizzoni, who obtained it from the blood-serum of a dog which had been rendered "strongly immune" against tetanus. On the afternoon of September 18th, 15 centigrammes of this antitoxine, dissolved in water, was injected beneath the skin. The same quantity was injected the following day. On the morning of the 20th the patient was decidedly better; on the afternoon of this day he received 25 centigrammes of the antitoxine, and the same amount on the following day. After each injection there was a notable fall in the temperature. The patient continued to improve, and on the 23d all symptoms of tetanus had disappeared.

In a postscript to his communication, Dr. Schwarz states that he has private information of two other patients who have recovered from tetanus under the same treatment—one in the hospital at Colle di Val d'Elsa (Tuscany), treated by Dr. Pacini; the other in the surgical clinic at Innsbruck, treated by Professor Nicoladoni. Another case has since been reported by Finotti.[1]

Since the above was written a sixth case, successfully treated, has been reported by Taruffi.[2]

If further experience establishes the value of this treatment, no physician will fail to recognize the fact that medical science has taken a new departure, and that bacteriological studies have led up to practical results of the greatest importance. Nor is it likely that the therapeutic possibilities in this direction will be limited to the disease in which the successful *experimentum crucis* has been made upon man.

The experiments of Behring give us reason to hope that the potent toxalbumin of the diphtheria bacillus may be neutralized in the bodies of infected individuals. Having succeeded in rendering animals immune against the pathogenic action of the diphtheria bacillus, Behring ascertained that the blood of these animals neutralizes the toxic potency of filtered cultures of this bacillus, either before or after injecting it into susceptible animals.

Another disease in which extremely promising experimental results have been obtained is croupous pneumonia. The experiments of G. and F. Klemperer[3] show that the blood-serum of animals which have an artificial immunity against cultures of micrococcus pneumoniæ crouposæ—so-called "diplococcus pneumoniæ"—when injected into other susceptible animals renders them immune; and, also, when injected

[1] Wiener klin. Wochenschr., 1892, No. 1.

[2] Centralbl. f. Bakteriol., May 16, 1892.

[3] Berliner klin. Wochenschr., 1891, Nos. 34 and 35.

into the circulation of animals inoculated with a virulent culture of this micrococcus it has a curative action, apparently depending upon its power to neutralize the toxic products to which the pathogenic effect of these cultures is due, as in the cases heretofore mentioned. The authors named found no difficulty in establishing immunity in rabbits, by injecting filtered cultures into their tissues, but they found that this immunity was only established after an interval of several days, indicating that a certain time is required for the reaction on the part of the tissues which results in the formation of an antitoxine. But the blood of an immune animal, containing this antitoxine, when injected into the circulation of a susceptible animal confers immunity upon it at once.

Similar results have been obtained by Emmerich and Fawitzky,[1] whose researches relate both to pneumonia and to the disease of swine known in Germany as *rothlauf* (hog-erysipelas). They report their success in arresting the fatal malady resulting from the injecting into rabbits of cultures of the micrococcus of pneumonia or the bacillus of rothlauf, by injecting into these animals, after infection, the blood or tissue juices of immune animals. When the injection is made shortly before inoculation with a virulent culture, infection does not occur. As a result of their investigations the authors referred to express the hope that croupous pneumonia in man may be arrested by a similar mode of treatment.

From analogy, based upon the experimental evidence heretofore referred to, the successful treatment of tuberculosis would appear to call for the administration of an anti-tuberculin rather than that of the active toxic principle elaborated by the tubercle bacillus. And already we have experimental evidence indicating that this is the case.

The Italian investigators Tizzoni and Cantani[2] have recently published a preliminary communication, in which they give the results of experiments which appear to show that in guinea-pigs treated with tuberculin, by Koch's method, a substance is developed which neutralizes the tubercle virus either *in vitro* or in the body of an animal inoculated with a pure culture of the bacilllus.

The facts already stated would lead to the inference that animals which have an artificial immunity against rabies as a result of inoculation with an attenuated virus, owe this immunity to the presence of an antitoxine in their blood or tissue juices. This inference is supported by recent experimental evidence. Professor Tizzoni and his associate, Dr. Schwarz, have published an important paper in the *Annales de Micrographie*, January, 1892, in which the following results are reported:

Blood-serum taken from a rabbit which has an artificial immunity

[1] Centralbl. für Bakteriol., Bd. x, 1891, p. 714. [2] Ibid., 1892, Bd. xi. p. 82.

against rabies has the power of neutralizing, *in vitro*, the virulence of the spinal marrow of a rabid animal, after a contact of five hours. The blood-serum of dogs which have an acquired immunity against the virus of rabies has a similar action, but in a much slighter degree.

The substance present in the blood-serum of an immune rabbit, to which its antitoxic action is due, *does not dialyse*. It is precipitated by alcohol, and preserves its activity, to a considerable extent, after being precipitated. It has the characters of a globulin. It is soluble in glycerin.

Blood-serum from an immune rabbit has the power of neutralizing the virus of rabies not only *in vitro*, but also in the body of an inoculated animal. And the experimenters named succeeded, as a rule, in conferring immunity upon susceptible animals by inoculating them with blood-serum containing this antitoxine. They also obtained evidence of its curative power when injected into inoculated animals some time after the inoculation. The antitoxine of rabies, as also that of tetanus, is found only in the serum of the blood, and not in the tissues—nervous or muscular—or in the parenchyma of the various organs, liver, spleen, and kidneys.

Finally our authors state their belief that the use of this antitoxine may probably be substituted for Pasteur's inoculations with an attenuated virus, with a view to preventing the development of rabies in man after the bite of a rabid animal. And, also, that it may prove to be curative after the symptoms of rabies are developed.

I have now to refer to other investigations of great importance in their bearing upon the subject under consideration. Professor Ehrlich,[1] of Berlin, has recently published his researches with reference to the pathogenic action of certain toxalbumins not produced by bacteria, but which are similar in composition and in toxic action to some of those extracted from cultures of pathogenic bacteria. He has shown that susceptible animals may be made immune against the toxic action of these proteids, and that the blood and tissue juices of the immune animal contain an antitoxine to which this immunity is due.

Dr. Sewall[2] showed several years ago (1887) that immunity from the toxic action of rattlesnake venom may be produced by the previous injection of small doses of the "hemi-albumose" to which it owes its potency.

In this connection we may remark that there is some evidence to show that persons who are repeatedly stung by certain poisonous insects—mosquitoes, bees—acquire a greater or less degree of immunity from the distressing local effects of their stings.

[1] Deutsche med. Wochenschr., 1891, No. 44.

[2] Journal of Physiology, 1887, vol. viii. p. 203.

The experiments of Ehrlich were made with toxalbumins of vegetable origin: one—*ricin*—from the castor-oil bean; the other—*abrin*—from the jequirity bean. The toxic potency of ricin is somewhat greater than that of abrin, and it is estimated by Ehrlich that one gramme of this substance would suffice to kill one and a half millions of guinea-pigs. When injected beneath the skin, in dilute solution, it produces intense local inflammation, resulting in necrosis. Mice are less susceptible than guinea-pigs, and are more easily made immune. This is most readily effected by giving them small and gradually increasing doses with their food. As a result of this treatment the animal resists subcutaneous injections of two hundred to four hundred times the fatal dose for animals not having this artificial immunity. The fatal dose of abrin is about double that of ricin. When injected into mice in the proportion of 1 c.c. to 20 grammes of body weight a solution of one part in 100,000 of water proved to be a fatal dose. The local effects are also less pronounced when solutions of abrin are used; they consist principally of an extensive induration of the tissues around the point of injection, and a subsequent falling off of the hair over this indurated area. When introduced into the conjunctival sac, however, abrin produces a local inflammation in smaller amounts than ricin, a solution of 1 : 800 being sufficient to cause a decided, but temporary, conjunctivitis. Solutions of 1 : 50 or 1 : 100 of either of these toxalbumins, introduced into the eye of a mouse, give rise to a panophthalmitis which commonly results in the destruction of the eye. But in mice which have been rendered immune, by feeding them for several weeks with food containing one of these toxalbumins, no reaction follows the introduction into the eye of the strongest possible solution, or of a paste made by adding abrin to a little 10 per cent. salt solution. Ehrlich gives the following explanation of the remarkable degree of immunity established in his experiments by the method mentioned:

"All of these phenomena depend, as may easily be shown, upon the fact that the blood contains a body—antiabrin—which completely neutralizes the action of the abrin, probably by destroying this body."

In a more recent paper Ehrlich[1] has given an account of subsequent experiments, which show that the young of mice which have an acquired immunity for these vegetable toxalbumins may acquire immunity from the ingestion of the mother's milk. And, also, that immunity against tetanus may be acquired in a very brief time by young mice through their mother's milk. In his tetanus experiments, Ehrlich used blood-serum from an immune horse to give immunity to the mother mouse, when her young were already seventeen days old. Of this blood-serum 2 c.c. were injected at a time on two successive days. The day after the

[1] Zeitschr. f. Hygiene, 1892, Bd. xii. p. 183.

first injection one of the sucklings received a tetanus inoculation, by means of a splinter of wood to which spores were attached. The animal remained in good health, while a much larger control mouse, inoculated in the same way, died of tetanus at the end of twenty-six hours. Other sucklings inoculated at the end of forty-eight and seventy-two hours after the mother had received the injection of blood-serum, likewise remained in good health, while other control mice died.

In a recent communication (1892) Brieger, Kitasato, and Wassermann[1] have published the results of their interesting experiments with a bouillon made from the thymus gland of the calf. It was found that the tetanus bacillus cultivated in this bouillon did not form spores, and had comparatively little virulence. Mice or rabbits inoculated with it in small doses—0.001 to 0.2 c.c. for a mouse—proved to be subsequently immune. And the blood-serum of an immune rabbit injected into the peritoneal cavity of a mouse—0.1 to 0.5 c.c.—was found to give it immunity from the pathogenic action of a virulent culture of the tetanus bacillus. Similar results were obtained with several other pathogenic bacteria cultivated in the thymus bouillon—spirillum of cholera, bacillus of diphtheria, typhoid bacillus.

A most interesting question, growing out of these extraordinary experimental results, at once presents itself. Does the animal which is immune for one of these toxalbumins also exhibit immunity as regards the toxic action of the other? This question Ehrlich has answered. His experiments show that animals which are immune against one of these substances are quite as susceptible to the toxic action of the other as if they did not possess this immunity—*i. e.*, the antitoxine of ricin does not destroy abrin, and *vice versa*. As an illustration of the fact he states that in one experiment a rabbit was made immune for ricin to such an extent that the introduction into its eye of this substance in powder produced no inflammatory reaction. But the subsequent introduction of a solution of abrin, of 1 : 10,000, caused a violent inflammation.

Evidently these facts are of the same order as those relating to immunity from infectious diseases, and taken in connection with the experimental data previously referred to, give strong support to the view that the morbid phenomena in all diseases of this class are due to the specific toxic action of substances resembling the toxalbumins already discovered, and that acquired immunity from any one of these diseases results from the formation of an antitoxine in the body of the immune animal.

In the case of a number of infectious diseases it is demonstrated that the toxalbumin is produced by a specific microörganism. But we have

[1] Zeitschr. f. Hygiene, 1892, Bd. xii. p. 137.

no satisfactory evidence that this is the case in the strictly contagious eruptive fevers. So far as these diseases are concerned, the doctrine of a *contagium vivum* rests solely upon analogy, and upon the assumption that the evident increase in the quantity of the infectious material which occurs in the body of an infected individual is proof of self-multiplication, which is a property of living matter only. While fully recognizing the force of this reasoning, we must insist that the experimental evidence at present available does not justify a generalization to the effect that all infectious diseases are due to specific microörganisms. And it seems worth while to at least stop to inquire as to the possibility of a different explanation in those diseases, such as smallpox and scarlet fever, in which there is no evidence of an increase of the specific poison outside of the bodies of infected animals, and in which a living infectious agent has not been demonstrated. Is it possible that in these diseases the toxalbumin which gives them their specific character is a product of the living cells of the body of the infected animal? Other questions which remain to be settled relate to the production and retention of antitoxines in the bodies of immune animals. Is production continuous during immunity, or does it occur only during the modified attack which results from inoculation with an attenuated virus, or of filtered cultures, the antitoxine being subsequently retained in the circulating blood? The latter supposition does not, at first view, appear very plausible. But it must be remembered that *these albuminous bodies do not dialyse: i. e.*, they do not pass through animal membranes, and consequently would not readily escape from the bloodvessels, notwithstanding the fact that they are held in solution in the circulating fluid. On the other hand, the passage of the tetanus antitoxine into the mother's milk, as shown by Ehrlich's experiments upon mice, indicates a continuous supply, otherwise the immunity of the mother would soon be lost.

Evidently the production of an antitoxine during an attack of any one of the infectious diseases would account for recovery in non-fatal cases; and it may be that this is the true explanation of self-limitation in diseases of this class. If Nature adopts this method of cure, we but follow her if we seek to introduce more of the antitoxine for the purpose of arresting the progress of cases of unusual severity and fatal tendency.

In the experiments of G. and F. Klemperer, it was noted that when the serum of an immune animal was injected into the circulation of an animal suffering from septicæmia, resulting from infection with mic. pneumoniæ crouposæ, the temperature was promptly reduced to the extent of two or three degrees centigrade. And in the case of tetanus reported by Schwartz, the temperature fell a degree or more after each injection.

Although the production of these antitoxines in considerable amounts for therapeutic use will be attended with difficulties, there can be no

doubt that methods will be devised for obtaining them on a large scale as soon as it is definitely established that they may be successfully used as specifics in the treatment of infectious diseases.

In diseases which are common to man and the lower animals, the source from which they may be obtained is evident. But in the diseases peculiar to man, we do not at present see just how they are to be obtained. Reasoning from the analogy afforded by the experimental evidence heretofore referred to, we infer that the blood and tissue-juices of an individual who has recently suffered an attack of smallpox or scarlet fever contains an antitoxine which would neutralize the active poison of the disease in the circulation of another person immediately after infection. Whether a small quantity of blood drawn from the veins of the protected individual would suffice to arrest the progress of the diseases mentioned, or to modify their course, can only be decided by experiment. But the experiment seems to me to be a legitimate one. Possibly transfusion of a moderate amount of blood from one to the other might prove to be curative; or, if made in advance of infection, might confer immunity. Or it may be that an antitoxine can be obtained from the blood of vaccinated calves which would have a curative action in smallpox. This possibility I have undertaken to determine by the experimental method, and now make the following preliminary communication relating to the results already obtained:

The following experiments have been made with the kind assistance of Dr. Wm. E. Griffiths, who has for many years been engaged in the production of vaccine virus in the city of Brooklyn, and consequently is an expert in the vaccination of calves, and in recognizing vaccinia in these animals. Upon visiting Dr. Griffiths, and making known to him my desires, I found him quite willing to assist me; and, also, that he had a recently vaccinated, and, consequently, immune calf in his stable. This animal had been vaccinated in numerous places, upon the abdomen and thighs, fourteen days previously. The vaccination was entirely successful, and a large number of quills had been charged from the vesicles which formed. At the time of my visit for the purpose of collecting blood-serum from this animal, dry crusts still remained attached at the points where vaccination had been practised two weeks previously. On the 28th of April I collected blood-serum from a superficial vein in the hind leg of this calf. This blood was placed in an ice-chest for twenty-four hours, at the end of which time the clear serum was drawn off in Sternberg's bulbs. Four drops of this serum were placed in each of two small, sterilized glass tubes. In one of these we placed three quills charged with fresh vaccine lymph from a calf; at the end of an hour the quills were removed, after carefully washing off in the serum the lymph with which they had been charged. In the other tube we mixed with the four drops of blood-serum an emulsion made from a fragment of a perfectly fresh vaccine crust from the arm of a child; this was crushed upon a piece of glass, and rubbed up with a little of the same blood-serum. The two tubes were now placed in an ice-chest for twenty-four hours, at the end of which time the contents were used

to vaccinate a calf purchased for the purpose. Dr. Griffiths carefully shaved the thighs of this calf, and scarified each thigh in several places, as he is accustomed to do in vaccination for the propagation of lymph. The contents of the tube containing lymph from the quills were rubbed into the scarified places upon one thigh, and the contents of tube containing the emulsified crust into the other. On the 8th of May, nine days after the vaccination, the calf was carefully examined, and it was ascertained that the result of the vaccination was entirely negative.

Evidently it was necessary to make a control experiment before we would be justified in ascribing this negative result to a neutralization of the virus by some special substance present in the blood-serum of an immune calf. Possibly the blood of a non-immune calf might also, after an exposure of twenty-four hours, neutralize the specific virulence of vaccine lymph. The control experiment was made as follows:

On the 9th of May we collected blood from a vein in the leg of a non-immune (not vaccinated) calf; this was placed in the ice-chest for twenty-four hours, and the following day clear serum was collected in Sternberg's bulbs; three quills charged with fresh lymph from a calf, of the same lot as those used in the previous experiment, were placed in four drops of this blood-serum in each of two small glass tubes. As in the previous experiment the lymph was washed from the quills at the end of an hour, and the tubes were placed aside in the ice-chest. At the end of twenty-four hours the serum in these two tubes was used to vaccinate the same calf which had served for the previous experiment. Several points were scarified upon the left thigh and upon the left side of the abdomen, which were carefully shaved for the purpose.

At the same time the animal was vaccinated upon the right thigh and upon the right side of the abdomen with virus mixed with blood-serum from the immune calf. This serum, collected in Sternberg's bulbs on the 28th of April, had since been kept in the ice-chest. One hour before the vaccination four drops of this blood-serum were mixed with one drop of liquid lymph, which had been recently collected by Dr. Griffiths, in a capillary tube, from a vaccinated calf. At the same time three quills charged with bovine lymph were immersed in four drops of the same blood-serum—from immune calf. As stated, the animal was vaccinated upon the right side of the abdomen and upon the right thigh with this virus, which had been exposed for one hour to the action of blood-serum from an immune calf. The serum containing the liquid lymph was rubbed into the scarifications on the right side of the abdomen; the serum containing lymph from the quills into the right thigh. On the 19th of May, eight days after the vaccination, the animal was carefully examined by Dr. Griffiths and myself, and the following results noted: Upon the left thigh and left side of the abdomen the vaccinations—from quills in non-immune blood-serum, after twenty-four hours' contact—were entirely successful, the scarifications being surrounded by characteristic vesicles, and covered by characteristic crusts. Upon the right thigh—vaccinations from quills immersed in blood-serum from immune calf for one hour—and upon the right side of abdomen—vaccinations with liquid lymph mixed with blood-serum from immune calf—the result was entirely negative. Several of the scarifications had entirely healed; others were covered with a dry scab, which was easily detached, and under which the scarification was healing, without any appearance of vesicles such as surrounded the scarifications upon the left side.

The result of the experiments made is, therefore, very definite, and shows that the blood-serum of an immune calf contains something which neutralizes the specific virulence of vaccine virus, either bovine or from humanized lymph—crust from the arm of a child.

It is my intention to follow up this line of investigation, to endeavor to isolate this antitoxine of vaccinia, and to test the question of its possible specific action in neutralizing the smallpox virus in infected individuals, either before or after the development of the disease.

LOCAL ANÆSTHESIA AS A GUIDE IN THE DIAGNOSIS OF LESIONS OF THE LOWER SPINAL CORD.[1]

By M. Allen Starr, M.D., Ph.D.,

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Every fact which bears upon the exact localization of disease in the nervous system is entitled to most careful study, for the experience of the past ten years has demonstrated that the surgical treatment of nervous diseases—a treatment more radical, and sometimes attended by far greater success than medical treatment — must rest upon accurate diagnosis.

The study of motor disturbances, both of the form of paralysis and of the form of variations in reflex activity, has made it possible to determine the situation of lesions in the spinal cord with some exactness. The level of the cord at which the various reflex acts are performed is quite well known. The extent through various segments of the cord of those groups of cells which govern various muscles is also settled.[2]

But the spinal cord has sensory as well as motor functions, and it is only within a short time that the disturbances in sensation occurring in spinal lesions have been utilized for purposes of diagnosis.

This is partly due to the fact that the examination of sensory defects is tedious, and the results may be quite uncertain unless great care is taken in mapping out upon a convenient diagram the areas of anæsthesia. It may be partly due to the fact that the method of examination is often imperfect. For in examining for sensory defects it is always to be remembered that the test involves a contrast between two sensations, a process of comparison in the mind of one perception with another, and unless the two perceptions are presented simultaneously, such comparison is apt to be imperfect. It is not enough to ask a patient whether

[1] Read before the Association of American Physicians in Washington, May 25, 1892.

[2] See "Syringomyelia," The American Journal of the Medical Sciences, May, 1888.

he feels the touch of the cotton-wool, or the tip of the finger, or the warm or cold test-tube, or the prick of the needle, or the sting of a faradic brush; nor is it sufficient to touch two parts successively, and demand that he compare a sensation with a memory. He should always be tested upon two surfaces simultaneously, and asked if any difference is felt between the sensations. The necessity of this is evident when it is considered, yet observation has convinced me that it is not the method commonly employed. In spinal affections we always have the face as a convenient surface with which to make comparisons; and in the diseases of the lower region of the cord, to which attention is directed in this paper, we have the arms and trunk as a standard of normal feeling.

It has been my good fortune during the past few years to observe a number of patients suffering from disease in or about the lower half of the spinal cord, who have presented very interesting disturbances of sensation. In the medical journals and works I have found a few cases of more or less similar character—some of them with post-mortem records.

I hope to show from their study that a limited area of anæsthesia is produced by a limited lesion in the spinal cord; that as the lesion ascends the cord from its lowest limit upward, the area of anæsthesia extends in a definite manner upon the surface of the body; and that the situation and shape of the area of anæsthesia are positive indications of the level of the lesion in the spinal cord.

These facts are not wholly new. It has long been known that in transverse dorsal myelitis, the band of anæsthesia about the body corresponded to the level of the lesion. But there are many cases of myelitis of the cervical and lumbar regions of the cord in which the exact distribution of anæsthesia has been overlooked. This is especially true of lumbar and sacral myelitis, which is the form most frequently met with, and which alone will be considered in this paper. The situation of the anæsthesia in lesion of the lower part of the cord is such as to escape attention unless searched for; and as the patients lie in bed upon their backs, and sensation is often preserved in the front of the legs and thighs, the examiner, being content with the investigation of these parts, is misled into supposing that there is no anæsthesia.

The exact area of anæsthesia in lumbo-sacral myelitis has been investigated by various clinical observers, and isolated cases have been recorded.[1] Thus Westphal, Rosenthal, Huber, Bernhardt, Oppenheim,

[1] Westphal: Charité Annalen, 1882, i. 421. Rosenthal: Wiener med. Presse, 1887, xxix, 670. Huber: Wiener med. Wochenschr., 1888, xxxviii. 1310. Bernhardt: Berl. klin. Wochenschr., 1888, xxv. 637. Oppenheim: Arch. f. Psych., 1889, xx. 298. Eulenberg: Zeitschr. f. klin. Med., 1890, xviii. 547. Ross: Brain, 1887, x. 333. Thorburn: Brain, 1887, x. 381. Osler: Medical News, December 15, 1888. Mills: Medical News. March 1, 1890. Herter: New York Medical Journal, August 22, 1891. Church: The American Journal of the Medical Sciences, April, 1892.

and Eulenberg, in Germany, Ross and Thorburn, in England, and Osler, Mills, Herter, and Church, in this country, have recorded cases. French observers who have made careful study of hysterical anæsthesia have appeared to overlook this subject. The only effort to bring the recorded cases together and make deductions from them has been made by Thorburn in his work upon the *Surgery of the Spinal Cord*. Since that work was written several important cases have been published with autopsies. And as I have had the opportunity of seeing six cases in which limited areas of anæsthesia aided the localization of the lesion, it has seemed proper to record these cases and review the subject carefully.

The cases of special importance will first be described, and the conclusions from their study will then be considered.

CASE I. (Starr.) *Injury; sphincteric paralysis; limited anæsthesia; lower sacral lesion.*—The first case is that of an engineer, J. L., who met with an injury in July, 1891, his engine falling some thirty feet, while he remained in a sitting posture in it, and thus received the blow upon his lumbar region, where there still remains the evidence of injury in a slight protrusion of the first and second lumbar spinous processes, with some induration about them. He found himself unable to rise after the fall, felt much pain in the lower sacral region and at the upper lumbar vertebræ, and at once lost control of his bladder and rectum. For five weeks after the injury he lay in his bed, though able to move his legs freely; and after this he got up and has walked, and now (March, 1892) walks perfectly well. The only evidence at any time of motor trouble was a twitching of the muscles of the outer side of the legs below the knees, which persisted for several months after the injury, but has now passed away. According to his statement, this twitching must have been limited to the peronei in both legs. For four months after the injury he was obliged to use a catheter and to wash out his rectum. At present (March, 1892) his sphincters are not under perfect control, his urine flowing as soon as his bladder is moderately full, though it never dribbles away, and his rectum occasionally emptying itself suddenly. He is however, slowly regaining control of both organs, but there is little resistance at the anus, and he wears a napkin. From the day of the accident to the present time he has felt a numb sensation in the lower sacral region, in the perineum, and back of the scrotum in the area shown in the diagram (Fig. 1). He is an intelligent man, and is quite certain that the sensory disturbances in this area have not varied, having been tested by several physicians since the injury. An examination shows a total loss of temperature- and pain-senses in the area marked out, and a marked diminution, but no loss, of tactile sense. The diminished tactile sense extends over the entire scrotum and posterior half of the penis, and is possibly the reason for an imperfect power of connection of which he complains, his sensations being slight, the flow of semen premature, and erection too short in duration, although he has impregnated his wife since the accident. There is no trace of anæsthesia of any kind elsewhere in his body. His knee-jerks are normal. The gluteal reflexes are absent. No ankle clonus. The complete absence of any symptoms of traumatic neurosis is interesting, and also the gradual improvement in the motor, reflex, and automatic symptoms, the only permanent symptom being the total anæsthesia to temperature and pain and the partial anæsthesia to touch in the limited area.

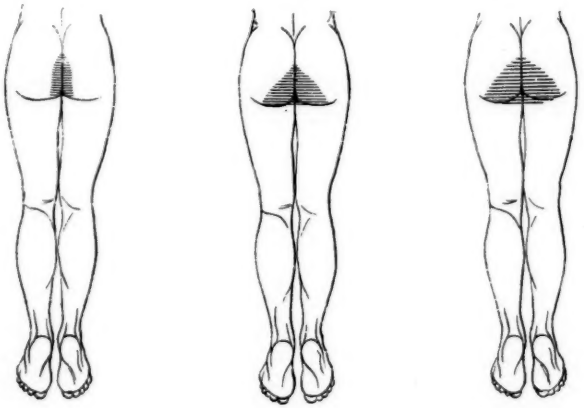
The diagnosis was a hemorrhage in the lowest part of the spinal cord.

CASE II. (Rosenthal.) *Sphincteric paralysis; limited anæsthesia; sacral lesion.*—Female, aged thirty-six years. After exposure to cold and fatigue, felt some pain in urinating and numbness in her buttocks. Four days later

the pain and numbness had increased, she began to have retention of urine, and lost control of her rectum. Seven months later, when seen by Rosenthal, she was found to have anæsthesia to all sensation in the area shown in Fig. 2, including the genitals up to the mons veneris; she had no control of the bladder, which emptied itself spontaneously every two hours; she had no control of the rectum, and could move the bowels by enema only—but was perfectly able to walk. This condition had persisted for four years when the case was reported.— *Wiener med. Presse*, xxix. 670.

Rosenthal ascribed the condition to a hemorrhage, with destruction of the lowest part of the spinal cord.

Fig. 1. Fig. 2. Fig. 3.



Starr. Rosenthal. Westphal.

Case III. (Westphal.) *Sphincteric paralysis; limited anæsthesia. Autopsy—gumma of cauda equina.*—Female, aged thirty-six years; began to suffer in September, 1874, from pain in the legs and fatigue on exertion, with some numbness from the feet to the knees and a disagreeable sensation of pressure in the rectum. Soon afterward she lost control of the rectum, and began to have retention of urine. Then anæsthesia developed in the genitals, perineum, anus, and buttocks. When examined by Westphal, in December, 1874, she was found to be completely anæsthetic to touch, temperature, pain, and electricity in the area shown in Fig. 3, and also in the perineum, vagina, and over the external genitals up to the mons; there was a large bedsore in the anæsthetic area over the sacrum; there was retention of urine, which had to be drawn by catheter, the passage of which she did not feel; there was inability to empty the rectum, except by mechanical means; the anal sphincter was not relaxed, but grasped the finger. Motion was in no way impaired. She died December 27th, and the autopsy showed caries of the sacrum, and a gummy mass with hemorrhagic exudation and connective tissue filling the entire spinal cavity within the sacrum as high as the first sacral nerve, and compressing slightly all the sacral nerves except the first. The spinal cord was normal.—*Charité Annalen*, i. 421.

The following case, reported by Kirchkoff (*Arch. f. Psych.*, x.), is of interest, since it includes a record of post-mortem appearances.

CASE IV. (Kirchkoff.) *Injury; sphincteric paralysis. Autopsy—compression of sacral cord.*—The patient, a man aged thirty years, fell from his horse upon his nates, and felt immediately severe pain in his sacral region, and was unable to rise. For three months he was confined to bed, suffering from pain in the back and retention of urine, which was followed by incontinence of urine and feces; then he was able to go about, though he walked slowly with legs rather separated. Sensation is said to have been retained when he was examined one and a half years after the injury. He gradually recovered entirely, except for the incontinence of urine and feces, which remained till his death one and a half years after the injury. The autopsy showed that a portion of the body of the first lumbar vertebra had been fractured and was compressing the lowest part of the spinal cord, involving the fifth, fourth, and third sacral segments without compressing the cauda equina, the nerves of which were found normal on microscopic examination.

It is not at all impossible that there may have been a limited area of anæsthesia in this case about the perineum which escaped notice, especially if, as in my first case, the sensations of pain and temperature were the only ones permanently lost. Lachmann, however, has recorded (*Arch. f. Psych.*, xiii. 50) a case of tumor of the conus medullaris and filum terminale in which loss of sphincter control was present without any anæsthesia.

CASE V. (Starr.) *Spontaneous hemorrhage into the sacral cord; sphincteric paralysis; limited anæsthesia.*—My second case is that of a woman, R. K., aged twenty-eight years, who was seen with Dr. F. J. Quinlan in October, 1889, and in February, 1890, and whose condition since the last date has been stationary. She was perfectly well until May, 1889, when, after a day of fatigue, she was suddenly seized with severe pain in the sacral region and in the back of both thighs, with retention of urine and feces, and a sensation of numbness over the lower sacral region, in the perineum and vagina. She did not lose her power, and has been always perfectly able to walk. When examined in October, 1889, she was suffering much from pain in the lower part of the sacrum and along the back of the left thigh in the area shown on the diagram (Fig. 4). She had total anæsthesia to touch, temperature, and pain over the area shown, and this included the perineum and anus, and the entire genitalia, excepting the upper part of the labia outside the vulva. Her urine had to be drawn by catheter; her bowels were moved with great difficulty and with much pain. The sphincter ani contracted on the finger. Her knee-jerks were exaggerated. Plantar and gluteal reflexes were normal. There was no tendency to bedsores, no tenderness of the back to pressure or to heat, no girdle sensation, and no anæsthesia of the legs or thighs.

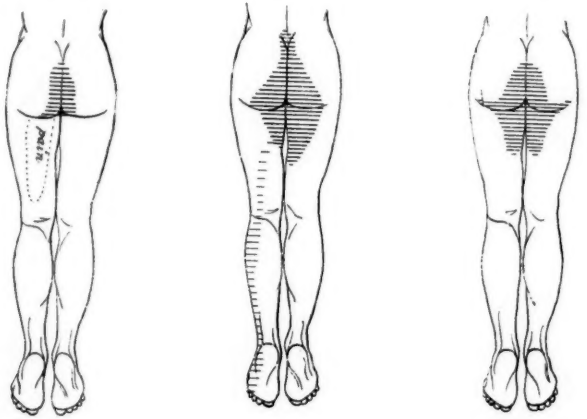
When examined again in February, 1890, she was still perfectly able to walk, but after long standing felt weak in the left leg, and found herself tired more easily than formerly. The leg was not at all atrophied, nor were the muscles paralyzed, but the response to faradism was diminished in the peroneal muscle as 60 to 45. Her bladder and rectum were still beyond her control, and were emptied by catheter and injections. She still had some pain in the back and in the left leg constantly, but recently had suffered more from pain in left ilio-inguinal region. There was no girdle sensation, spinal tenderness or bedsore. The area of total anæsthesia had increased, and now involved the area shown in Fig. 5. A slight degree of impairment of tactile sense was also found on the outer side of the left leg below the knee, and this could be traced from the anæsthetic region downward along a narrow space on the back of the thigh, indicated by the lighter shading in the figure. The original area of anæsthesia has therefore extended. The extension has been into the former area of pain, and the present area of pain has shifted from the back of the left thigh to the left groin.

It is also of interest to find that as the lesion has advanced upward and at last begun to invade the motor part of the spinal cord, it is in the peronei that the first sign of weakness—the diminution of the faradic contractility—has begun, thus confirming the statement of Leyden that these muscles are controlled by the lowest group of cells in the spinal cord (*Klinik der Ruckenmarkskr.*, i. 41).

Here, again, as in the first case, it is to be noticed that the areas of tactile disturbance and temperature and pain disturbance do not at present exactly coincide, and this seems to support the original diagnosis of a hemorrhage into the conus medullaris and lower sacral segments of the spinal cord. Such a hemorrhage might set up a chronic meningo-myelitis, and as this advanced slowly upward the symptoms would increase as they have done.

Such was the lesion in the following case of Oppenheim, which is reported with autopsy, and in which it will be noted that the final area of anæsthesia coincides quite closely with that in this case of my own.

FIG. 4. FIG. 5. FIG. 6.



Starr. Starr. Oppenheim.

CASE VI. (Oppenheim.) *Injury; sphincteric paralysis, limited anæsthesia. Autopsy—hemorrhagic sacral myelitis.*—The patient fell upon his buttocks and immediately lost control of his legs, and felt a numbness in them. His urine was retained. He was taken to Charité Hospital, and observed there until his death, three months later. The permanent symptoms were: loss of Achillis tendon reflex, loss of control of the bladder and rectum, loss of power of erection, loss of sensation, especially for painful sensations in the area indicated in Fig. 6, which included "the entire vicinity of the anus, the gluteal, perineal-scrotal region and the penis, and a narrow area reaching downward on the posterior inner surface of the thighs, and upward over the lower half of the sacrum." It is to be noticed that the loss of the pain-sense was more

complete than that of tactile sense. The autopsy showed a fracture of the first lumbar vertebra and a crushing of the posterior part of the conus medullaris and disintegration of the lower two-thirds of the sacral portion of the cord. "In the lowest portion the posterior half of the spinal cord seemed entirely destroyed, as if it had been cut off by an incision through the posterior columns 1–2 mm. behind the posterior commissure. The boundary is, however, by no means a regular one, but was encroached upon by a thick, very vascular tissue full of round cells, a part of the pia mater infiltrated with granular cells, small and large collections of blood-cells and new capillary vessels. The anterior part of the cord was also altered, being infiltrated with small round cells, while the nerve-cells were in part disintegrated. It was evidently a traumatic myelitis with hæmato-myelia." The only lesion

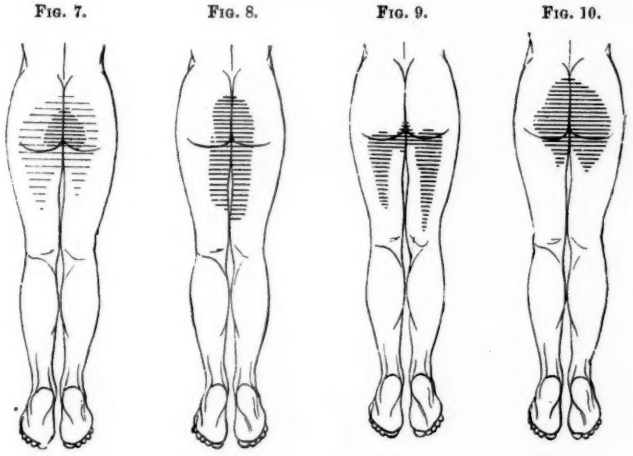


Fig. 7. Huber. Fig. 8. Bernhardt. Fig. 9. Osler. Fig. 10. Mills.

in the lumbar enlargement was the ascending degeneration in the posterior columns. The nerve-roots coming from the lowest part of the cord were involved in the lesion, being matted together in the thickened pia, but a microscopic examination showed that the nerve-roots which issued from the two upper sacral and lumbar portions of the cord were not affected, although they had to pass through the narrowed canal.—*Arch. f. Psych.*, xx. 298.

Cases almost identical in character are reported by Huber,[1] Bernhardt,[2] Osler,[3] and Mills,[4] without autopsies. The area of limited anæsthesia is shown in the accompanying figures. (Figs. 7, 8, 9, and 10.)

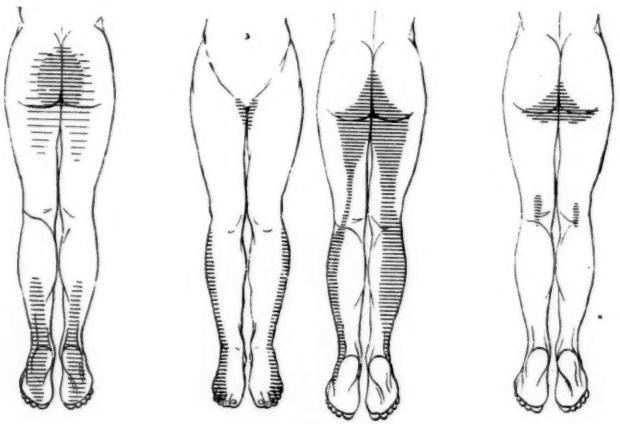
In the following case, reported by Herter, which was seen by me at his request, the area of anæsthesia was slightly more extensive. The case was completed by a pathological examination.

Case VII. (Herter.) *Injury; paraplegia, sphincter paralysis, limited anæsthesia. Autopsy—hemorrhage in spinal cord.* Male, aged thirty years, was crushed by a heavy weight on August 26, 1890, and immediately paralyzed

[1] Wien. med. Wochenschr., 1888.
[2] Berl. klin. Wochenschr., 1888.
[3] Medical News, 1888.
[4] Ibid., 1890.

in the legs and had involuntary passage of urine and feces. Five weeks later, when the effects of the shock had disappeared, the paralysis of the feet and legs remained with atrophy and reaction of degeneration below the knees, but the thighs could be moved; the bladder and rectum were totally paralyzed, neither sphincter offering any opposition to pressure; sexual power was lost; a bedsore had formed over the sacrum, and anæsthesia was present in the area shown in the diagram (Fig. 11) and included the perineum and genitals. The darker area over the buttocks was totally anæsthetic to touch, temperature, and pain; the lighter area was partially anæsthetic. The soles and dorsal surfaces of the feet were quite anæsthetic and analgesic. The patient improved during the following five months so that he was able to walk, but the anæsthesia remained the same. I saw the patient, with Drs. McCosh and Herter, in January, 1891. From the beginning there had been a prominence of the first lumbar spine, and on January 27, 1891, the operation was undertaken, and the spines and laminæ of the first, second, and third

FIG. 11. FIG. 12. FIG. 13.



Herter. Eulenberg. Eulenberg.

lumbar vertebræ were removed, and the cauda equina was exposed. Nothing could be found at the operation. The patient died forty-eight hours later.

The autopsy showed the existence of an old hemorrhage and a mass of inflammatory material in the cauda equina and involving the lower three-quarters of an inch of the spinal cord. The nerve-fibres of the most centrally situated strands of the cauda were completely degenerated. The anterior strands also contained degenerated nerve-fibres. The lateral bundles escaped. The conus medullaris was destroyed. The lesion did not reach as high as the fourth lumbar roots, which were normal.—HERTER, *N. Y. Med. Journ.*, Aug. 22, 1891.

In the following case, recorded by Eulenburg, the hemorrhage was spontaneous and not traumatic in origin, and the subsidence of the symptoms indicated a gradual absorption of the clot.

CASE VIII. (Eulenberg.) *Sphincter paralysis, limited anæsthesia.*—Female, aged thirty-six years; had suffered occasionally for five years from endometritis and pains in back and legs, and was suddenly seized at Christmas, 1887,

with severe pain in the back and fell to the ground. For several weeks after this she was in bed, and on getting up limped in walking. In April, 1888, she had another attack of pain in the sacrum, and then developed paralysis of the bladder, with retention of urine and loss of sensation below the waist. Three months later the rectum became paralyzed, being emptied with enema with difficulty, though occasionally an involuntary movement occurred. She was first examined by Eulenberg in February, 1890. She then had pain in the back and in the bladder, with tenderness over the sacro-lumbar articulation. There was anæsthesia in the genitals, perineum, anus, and over the region shown in Fig. 12, the dark shading indicating a total anæsthesia. The gait was slow and uncertain, stepping up being difficult, as were also flexion of the knees and plantar flexion of the feet, the left calf and thigh being weaker than the right and slightly atrophied. Knee-jerks were normal. Achillis reflex lost, and plantar reflex imperfect. No gluteal reflex. All muscles acted to faradism, but it required a stronger current to contract the peronei and ante-tibials than the post-tibials. The bladder was usually emptied by catheter, but spontaneous evacuation occurred frequently. The rectum was beyond control and the sphincter ani was weak. Menses were regular.

Under treatment by strychnine and static electricity there was some improvement, and at the end of four and a half months the anæsthesia was diminished to the limits shown in Fig. 13, the genitals being still affected, this being the region originally of total anæsthesia; there was still imperfect control of bladder and rectum, but the power of the limbs seemed to have returned.—EULENBERG, *Zeitschr. f. klin. Med.*, xviii. 547.

These cases seem sufficient to demonstrate that small lesions in the sacral region of the spinal cord may produce limited zones of anæsthesia on the back, thighs, and outer side of the legs, and that the extent and shape of the anæsthesia vary with the extent or situation of the spinal lesion.

In contrast to these cases the following is of special interest, as it shows that in limited myelitis of the lumbar region the sensory functions of the sacral segments may be preserved and impulses may pass the diseased area of the cord and thus reach the brain.

CASE IX. (Starr.) *Central myelitis of the lumbar region, limited anæsthesia; paraplegia.*—The patient, a young married lady, after suffering for some months from backache, was suddenly seized, in May, 1891, with severe pain in the lower dorsal and upper lumbar region, which was much increased by motion and by lying down, and which was soon followed by pain down the left leg in the sciatic distribution. In August, 1891, a swelling appeared at the third lumbar vertebra which gradually disappeared in a month. Its nature is undetermined. On the 8th of August she suddenly lost sensation to heat and to pain in the left leg. On the 16th of September she lost power of motion in the right leg except in the foot. In October the left leg became paralyzed and sensations of touch were also lost. Finally, in November, the right leg became anæsthetic. Early in the disease retention of urine and obstinate constipation appeared and have continued, so that catheterization is necessary. During November the line of anæsthesia advanced slowly upward from the groins to a point half-way to the umbilicus, where it remains.

When she was seen in December, 1891, in consultation with Dr. J. G. F. Holston, there was total paralysis of motion below the waist, including back and pelvis, together with atrophy more marked above than below the knees. All reflex action was abolished. The muscles all reacted to a very strong faradic current, the reaction below the knees being more prompt than above, and there being normal galvanic response below the knees, and equal response to cathode and anode above the knees. The limbs were flaccid—cool, with-

out rigidity—and the occurrence of bedsores, to which there is a tendency in the back, was prevented by frequent change of position. The loss of sensation to touch, temperature, pain, and muscular sense was absolute below the middle of the lower abdomen and first lumbar spine, but on the back, in a saddle-shaped area of the surface shown in the diagram, Fig. 14, these sensations were not lost but only slightly diminished. This area was determined independently by Dr. Holston and myself at different times. This area of sensibility included the anus, perineum, and vagina. The bladder was under no voluntary control, urine being retained till drawn or passed in a stream when the bladder became full, and slight cystitis being present unless the bladder was constantly washed out with borax solution. The sphincter ani offered resistance to the finger. The evacuation of the rectum was difficult with enema, and always painful.

Here there was evidence of a total loss of all the functions of the lumbar segments of the cord, including the first, and of the *integrity of the sacral segments.* Sensory impulses were received in the latter, and made their way upward through the affected lumbar region—a fact which aids the diagnosis, inasmuch as it demonstrates that the myelitis in this region does not affect the posterior columns of the cord at that part, but must be confined to its gray matter and lateral portions.

FIG. 14.

Starr.

FIG. 15.

Starr.

The case is stationary at present (April, 1892). In regard to its diagnosis, it is quite possible to exclude a tumor compressing the cauda equina because of the order of appearance of the symptoms: 1, anæsthesia in left leg; 2, paralysis in right leg; 3, anæsthesia in right leg; 4, paralysis of left leg, an order implying the invasion of the spinal cord from its right half over toward its left half, producing at one stage a true picture of a Brown-Séquard paralysis. The possibility of an intra-spinal tumor or gliomatosis cannot be excluded, and it is very likely the cause of the destructive myelitis present. An operation has, however, been advised against, as it seems improbable that an intra-

spinal tumor could be removed with any prospect of recovery, the necessary destruction of the cord during the operation being liable to leave as serious results as the tumor is now producing. And the fact that sensory impressions pass up the cord at the seat of lesion, indicates that the tumor does not lie on the posterior surface where it might be most easily reached in an operation.

CASE X. (Starr.) *Syphilis of the spinal cord; sphincteric paralysis, limited anæsthesia and hyperæsthesia.*—Male, aged twenty-two years (Vanderbilt Clinic, No. 4711), had syphilis in January, 1891, with well-marked secondary symptoms from which he recovered. In November, 1891, he felt some weakness and numbness of the legs. In December, 1891, after dancing all night, found that he could not pass his water and had to have it drawn. At the same time noticed an increased numbness of his legs and felt weak in walking. Felt as if he were walking on a carpet. These symptoms increased gradually and have continued till the time he was first seen (February 11, 1892). Examination showed inability to control his urine, which at times flowed away when the bladder was full, and at all times was retained; constipation, a slight weakness of the legs, exaggerated reflexes and tendency to spastic gait, and a condition of hyperæsthesia to touch, temperature, and pain in area dotted in the figure (Fig. 15), over buttocks and on the outer calf of each leg and an area of anæsthesia of slight degree over the back of each thigh between the hyperæsthetic areas.

Under anti-syphilitic treatment and rest he recovered entirely in the course of a month.

The presence of a zone of hyperæsthesia around the body in transverse dorsal myelitis is often recognized. It is interesting to find areas of hyperæsthesia in this case, one corresponding to the area of anæsthesia from lower sacral lesions, one corresponding to the area of anæsthesia in lower lumbar regions, with a zone of anæsthesia between them.

The diagnosis of syphilis of the cord may be thought indefinite, and it is not impossible that at the time of sudden increase of his symptoms he may have had a slight hemorrhage into the spinal membranes over the sacral cord. But Erb has recently called attention to a peculiar association of symptoms which he considers characteristic of syphilis of the cord, and the patient's symptoms correspond closely to that condition. These symptoms are slight spastic gait and weakness, with increased reflexes but with very little muscular rigidity, interference with the bladder functions, and slight disturbances of sensation chiefly of the nature of paræsthesia in the legs. There are no symptoms above the waist. The onset is at first gradual, but the symptoms may increase suddenly, and under treatment may pass away. It will be seen that this case corresponds quite closely to this description.

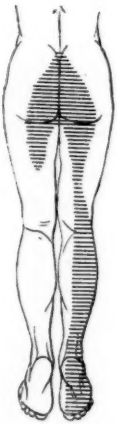
CASE XI. (Starr and Lloyd.) *Injury; compression of cauda equina; localized paralysis; sphincteric paralysis; limited anæsthesia; operation; recovery.*—Male; was struck, in April, 1889, on the back while in a kneeling posture, and sustained a fracture of the lumbar vertebræ. He was immediately paralyzed in his right leg; had loss of bladder and rectal control, and a considerable degree of anæsthesia whose area is uncertain. A year later he was seen

by me with Dr. Samuel Lloyd.[1] There remained a deformity of the lumbar region most marked at the third lumbar vertebra. There was total paralysis with atrophy and reaction of degeneration of the peronei, anterior and posterior tibial and glutei muscles of the right leg, and some weakness in the muscles of back of the thigh. There was diminished knee-jerk and no ankle clonus. There was loss of control of the bladder and rectum. There was anæsthesia in the area shown in the diagram (Fig. 16) to touch, temperature, and pain.

The diagnosis of compression of the cauda equina at the third lumbar level being made, Dr. Lloyd operated and removed the second and third lumbar spines and laminæ. The patient subsequently recovered very slowly but entirely from all his symptoms.

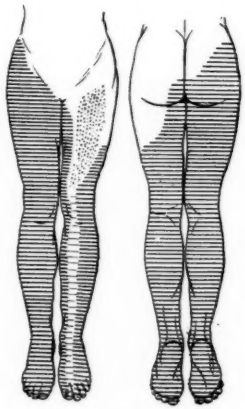
CASE XII. (Starr and McBurney.) *Injury; paraplegia, limited anæsthesia; operation; improvement.*—Male; suffered a fracture of the lumbar vertebræ in June, 1891, and was immediately paralyzed in both legs; lost control of his sphincters and had a loss of sensation in the legs. This anæsthesia, he said,

FIG. 16.



Starr and Lloyd.

FIG. 17.



Starr and McBurney.

was at first as high as the umbilicus and extended about the body, but within a month of the injury decreased slightly and had become permanently limited to the regions shown in Fig. 17. Bedsores developed soon. His condition had been stationary from August to October, when he was seen by me in Roosevelt Hospital at Dr. McBurney's request.

I found a total paralysis with reaction of degeneration of all the muscles of the lower extremities, with atrophy, loss of reflexes and of mechanical excitability, the abdominal muscles, however, being under control, and abdominal reflex preserved; complete loss of sensation in the area shown in the figure, to touch, thermic and painful and electric irritation, and an area of marked hyperæsthesia on the left thigh in front over the region dotted. He

[1] Dr. Lloyd has reported the case in full in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, July, 1891.

had no idea of the position of his feet and legs in bed or when moved. He had no control over his bladder, and his rectum was evacuated with difficulty by enemata. He had a deep bedsore over the sacrum, and bedsores on the ankles were prevented with difficulty. The deformity at the first, second, and third lumbar vertebræ was well marked, the second lumbar spine being deflected an inch to the right.

On October 31st Dr. McBurney removed the spines and laminæ of these vertebræ, revealing a fracture of the body of the second lumbar vertebra. The cauda equina was compressed between the body of the vertebra, which had been split off and projected backward, and the laminæ chiefly on the right side. When the cauda was entirely freed, pulsation returned in its vessels and in the dura. The dura was opened necessarily, and it was evident, from the appearance of the nerve-trunks, that they were degenerated. The wound healed promptly. The bedsores healed within three weeks of the operation. The control of his bladder and rectum had partially returned three months later, but no change in motion or sensation had been produced at the end of six months. He has suffered very greatly from pain in his legs ever since the operation.

The areas of anæsthesia and hyperæsthesia are interesting, and must have been due to compression of the entire cauda equina at the second lumbar nerve, being greater on the right side than on the left. It is evident that the bundles of the cauda lying on the surface on the left side were the only ones to escape.

Conclusions.—There are a number of interesting facts to be drawn from the study of the cases here collected.

First, *as to the location in the spinal cord of the centres of control of the bladder and rectum.* These centres appear to be uniformly affected together, and, therefore, must be adjacent to one another. The control of the sphincters is lost when the lesion involves the lower three sacral segments, and the centres probably lie in the lower two segments of the cord. This is proven by the autopsies in the cases of Kirchkoff, Westphal, Oppenheim, and Herter, and by the distribution of sensory symptoms in two of my cases, and in those of Rosenthal, Bernhardt, Eulenberg, Mills, and Huber. In these cases without autopsy the situation of the anæsthesia was such as to show that the lesion was limited to the two or three lower sacral segments, and in all the control of the sphincters was lost.

When these segments are destroyed, the sphincter of the rectum is relaxed and there is no opposition to the introduction of the finger into the anus. The entire rectum also loses its power of contraction so that it is only emptied by pressure from above or by artificial evacuation by means of enemata or excavation.

The sphincter of the bladder does not appear to be permanently relaxed when the cord is destroyed. At any rate a constant dribbling of the urine rarely, if ever, occurs. There is, however, a moderate incontinence, for as soon as a few ounces of urine collects in the bladder the pressure overcomes the slight resistance of the sphincter and the urine flows away. Hence a frequent emptying of the bladder without

the knowledge of the patient takes place. There is rarely a sufficient resistance offered by the sphincter to cause a retention of urine and distention of the bladder when the lesion destroys the bladder centres. This is much more liable to occur when the lesion lies at a somewhat higher level in the upper sacral region and produces an irritation of the mechanism of the bladder. It seems to occur also when the lesion involves the cauda equina, producing pressure on the nerve roots. Since pressure upon a nerve elsewhere never produces tonic spasm, this effect must be of a reflex nature from compression of the sensory filaments.

If, in a case of paraplegia, the mechanism of the bladder and rectum is not interfered with—if these organs empty themselves naturally when full—in spite of or without the knowledge or control of the patient, it is a proof that the lesion has not destroyed the lower sacral segments of the spinal cord. In such cases the exact area of anæsthesia should be carefully determined, for the information thus afforded may enable an exact diagnosis of the situation of the lesion and also of the actual extent on the cord to be determined. (See Case IX.)

Secondly, *as to the distribution of anæsthesia in lesions of the lower part of the spinal cord.* This is shown in the diagrams (Fig. 18). These diagrams have been prepared by carefully comparing and superposing the charts of cases cited. In some cases the area of anæsthesia was strictly limited from the outset to a special region. In other cases the area of anæsthesia was large at the outset and gradually diminished in extent. In other cases still the area of anæsthesia was at first small and then increased. The three sets of cases, therefore, must agree in their results, in order to establish any conclusion as to the areas of anæsthesia produced by lesions at various levels. And if the cases here collected be carefully studied, it will be seen that they do thus agree. In the diagram of the back it is possible to outline seven concentric zones of anæsthesia, starting from the lowest part of the sulcus between the buttocks as a centre. These are numbered *I.* to *VII.* in the diagram.

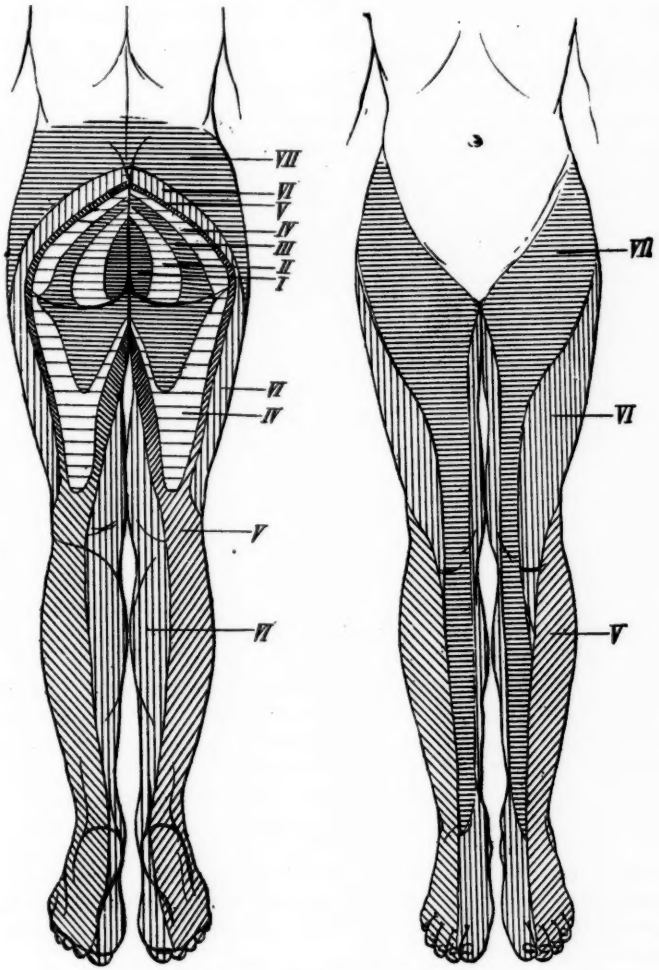
I. The *first zone* is oval in shape, small in extent, and includes the perineum, the posterior part of the scrotum in males, the vagina in females; it also includes the mucous membrane of the rectum.

II. The *second zone* is heart-shaped—point up—and includes the entire scrotum and posterior surface of the penis and mucous membrane of the urethra in males—the entire genitals of the female, except the outer surface of the labia majora and the mons veneris.

These two zones can be separated clinically, for in some cases the smaller zone only has been anæsthetic. In the majority of cases the larger zone has been found anæsthetic. No autopsies are at hand to enable a distinction of lesion to be made between these two zones, but from the cases of Kirchkoff, Westphal, and Herter it is possible to

affirm that the second zone is produced by a lesion involving the conus medullaris and the fifth and fourth sacral segments of the cord.

Fig. 18.



Areas of anæsthesia in lesions at various levels of the spinal cord from sacral v. to lumbar ii.

I. Sacral v.
II. Sacral iv.
III. Sacral iii.
IV. Sacral i.
V. Lumbar v.
VI. Lumbar iii.
VII. Lumbar ii.

III. The *third zone* is considerably larger, involving a greater surface of the buttocks and extending down the back of the thighs over a triangular area, point down. This has been named the "saddle-shaped area," coinciding about with the surface of the seat in contact with the saddle when riding. A zone of anæsthesia of this shape is due, as the autopsy in Oppenheim's case shows, to a lesion involving the fifth, fourth, and third sacral segments.

IV. The *fourth zone* is of a similar shape to the third, but more extensive, a greater surface on the back of the thighs being involved, and the anæsthesia extends in a band almost as low as the popliteal space. This area has been established clinically in several cases: there is as yet no autopsy to determine its lesion; but since the smaller zone is due to lesion at the third sacral segment, and the next larger zone is due to lesion in the fifth lumbar segment, it is allowable to conclude that this region corresponds with the second and first sacral segments.

In thus outlining four zones of the skin and assigning them to various segments of the sacral portion of the spinal cord, it is not my intention to lay down artificial boundaries or to affirm that all cases will exactly coincide. The lesions in the sacral cord are not limited exactly to one or two segments. The sacral cord is small in extent and lesions involve it to a greater or lesser degree, consequently these zones are not always symmetrical on the two sides of the body; the lesion being a little higher on one side of the cord than on the other, the zone of anæsthesia will be greater on one thigh than on the other, as in my first, fifth, and sixth cases, and in those of Herter, Mills, and Osler. I only wish to show that as the cord is invaded by disease from below upward, the area of the skin which becomes anæsthetic increases in extent, and that the shape of the area is characteristic; so that from the study of the area the extent of the lesion can be determined.

I also desire to call attention to the fact observed in my fourth case, that this area of the skin which corresponds to the sacral cord may remain sensitive in a lesion of the lumbar cord, when that lesion is so limited in extent as not to cut off impressions passing from the sacral cord to the brain. This affords an important evidence of the extent of a lesion in the lumbar cord. For if that lesion is transverse and involves all the columns, all sensation below its level will be lost, while, if the lesion is limited and does not affect the posterior columns of the cord through which impulses are passing up from the sacral region, the total anæsthesia will not include the parts of the skin related to the sacral cord.

Another conclusion of some importance is brought out from a study of these facts, viz., that in locomotor ataxia the lesion probably begins quite uniformly in the lumbar cord, and not in the sacral cord. In a review of about fifty cases of locomotor ataxia, of which I have careful records,

I find that the lightning pains of the initial stage and the hyperæsthesia especially to cold, which accompany them, are rarely referred to the buttocks and seat. They are quite uniformly referred to the feet or to the legs below the knees or to the front and outer sides of the thighs. Pain in the rectum, it is true, may be felt. In one of my cases the initial paræsthesia and anæsthesia occurred in the rectum and perineum, the complaint for several months being of a feeling as if a large cannon-ball were lying on the perineum. But such localization of pain and paræsthesia is the exception. If, however, the lesion of locomotor ataxia began in the sacral portion of the cord, it is reasonable to suppose that the sensory symptoms would be referred to the region of the body corresponding to that part of the cord, and that bladder disturbance would be the first symptom. It seems, therefore, quite probable that the lesion in locomotor ataxia begins in the lumbar region—a fact to which the early loss of knee-jerk also points. This may have a bearing on the disputed question as to whether locomotor ataxia is a true "system disease."

The area of anæsthesia produced by lesions in the lumbar cord is also determined by these cases and shown in the diagram.

V. The *fifth zone* of anæsthesia is seen to include the first four zones and to extend down the back of the thigh through the popliteal space in a band, and then to descend the outer surface of the leg to the foot. In some cases it ends at the ankle, in others it involves the entire side of the foot, dorsum, and sole, and three and a half toes. Eulenberg's case, cases of Kahler[1] and Mills[2] not cited here, and my second and fifth cases demonstrate this distribution. When a lesion extends from the sacral into the lumbar cord the anæsthesia extends from the thigh down the outer side of the leg. This area then corresponds to the fifth lumbar segment of the cord.

VI. The *sixth zone* of anæsthesia is produced by a lesion of the third lumbar segment. When the third lumbar segment is diseased, the entire back of the thighs and legs is anæsthetic and the front of thighs is also anæsthetic, except over a funnel-shaped zone which extends from above downward, the narrow tube of the funnel reaching along the shin even to the foot. This distribution of anæsthesia is well shown in Fig. 17, where the sensitive area in the midst of the anæsthetic zone is well defined. This zone will probably be separated later into two separate parts corresponding to lesions of the fourth and third lumbar segments. There is not as yet a sufficient number of cases to warrant such a distinction. The exact limits of anæsthesia on the feet are still uncertain, and no more exact statement than that given is warranted. It is quite common to find the inner arch of the foot sensitive when the

[1] Kahler: Prager med. Wochenschr., 1882.
[2] Mills: Med. News, March 1, 1890, Case I.

toes and heel and entire dorsum are anæsthetic, and it is probable that the higher the lesion the greater the anæsthesia on the foot.

VII. The last and *largest zone* of anæsthesia shown in the diagram is produced by a lesion of the four lower lumbar segments, that is, by destruction of all but the first lumbar segment of the cord. It will be noticed that the line of anæsthesia is much lower in front than behind, and that it follows the line of Poupart's ligament. It is only when the first lumbar segment of the cord is invaded that the abdominal wall becomes anæsthetic.

From this level upward the zone of anæsthesia extends around the body in a girdle, and there is no difficulty in locating the level of the lesion in the dorsal cord.

It is to be remembered that in all these lesions and areas of anæsthesia, the *anus, perineum, and the genitals are included in the insensitive region.* This is an important fact in the differentiation of cases of organic from functional paraplegia. It is also to be noticed that the shape of the area of anæsthesia in the back differs in organic and in functional cases.

FIG. 19.

Charcot.

Charcot[1] and his pupil, Souquès,[2] have described the area of anæsthesia in hysterical paraplegia, in paraplegia produced by hypnotic suggestion, and in the analogous form of functional paraplegia occurring after railroad and other injuries, and included under the general name of traumatic neurosis or traumatic hysteria. Fig. 19 shows Charcot's diagram. He says: "In front the limit of anæsthesia is represented by a line which follows the fold of the groin on each side to the anterior spine of the ilium, *exclusive of the genital organs;* on the back the line follows the insertion of the muscles of the buttocks exclusive of a V-shaped area over the sacrum." It will be noticed how entirely different this area of anæsthesia is from that due to any of the organic lesions described here. And the escape of the genital organs in the functional cases is also a most important point of diagnosis between hysterical and organic paraplegia.

The study of the area of anæsthesia, therefore, not only enables us to reach a diagnosis of the level of the lesion; but it also enables us to separate organic cases of spinal-cord disease from functional and hysterical cases of a paraplegic kind.

Multiple neuritis is sometimes attended by anæsthesia of the extremities. The anæsthesia is limited, however, to the hands and feet, or if it

[1] Charcot: Œuvres complètes, iii. p. 448.

[2] Souques: Iconographie de la Salpêtrière, iv., 1891.

extends up the limbs it is limited by a line drawn around the legs or forearms below the knees or elbows. It never resembles in its distribution the area of anæsthesia produced by lesions of the spinal cord.

Nor can the anæsthesia from injury of special nerve trunks be confounded with that due to spinal disease, as a reference to any diagram of the distribution of the cutaneous nerves will show.

Thirdly, in cases of transverse dorsal myelitis with a zone of anæsthesia about the body, there is usually present a zone of hyperæsthesia just above the zone of anæsthesia. An analogous condition has been observed in cases of lumbar and sacral myelitis, as shown by three of my own cases (Cases V., X., XII.). But in these cases the region of hyperæsthesia was situated in the area of the surface corresponding to the segments of the cord just above the lesion. In Case V. the area of anæsthesia corresponded to a lesion of sacral v. and IV., the area of pain and hyperæsthesia corresponded to sacral III. As the disease extended, the zone formerly hyperæsthetic became anæsthetic. In Case X. the area of anæsthesia corresponded to a lesion of sacral III. and IV.; the hyperæsthesia corresponded to sacral IV. and v. below, and to sacral I. above. In Case XII. the area of anæsthesia corresponded to a lesion of lumbar III. and below it; while the area of hyperæsthesia on the left side corresponded to the funnel-shaped area belonging to lumbar II. Thus the study of the areas of hyperæsthesia confirms the conclusions reached from a study of the areas of anæsthesia.

It may be affirmed that in lesions of the lower cord an area of hyperæsthesia will be usually discovered in the part of the body corresponding to the segment of the cord just above the lesion. And when a lesion is extending, the area previously hyperæsthetic will become anæsthetic. If the diagram be consulted, some conclusion regarding the extent of any given case can be drawn from a study of the relative positions of the areas of hyperæsthesia and anæsthesia.

Lastly, a few words must be added regarding the differentiation of lesions of the spinal cord from those of the cauda equina. The study of the anæsthesia alone does not aid very greatly in the differentiation. A lesion of the sacral nerve roots produces an identical area of anæsthesia as a lesion of the sacral cord. It also produces a paralysis of the bladder and rectum. Thorburn[1] has proved that pressure exerted on the cauda equina affects the nerves in the middle of the cauda to a greater extent than those near the surface. "Those nerves which pass out lower down are, in the cauda, situated nearer the middle line than those which pass out above them, and hence they would appear to have more room to escape from pressure, and we might expect them to suffer less rather than more; but that the contrary is the case is an established fact, and

[1] The Surgery of the Spinal Cord, p. 99.

we are able definitely to conclude that in a pressure lesion of the entire cauda equina those nerve roots which emerge lower down are more seriously injured than those above them." This conclusion has been proven by the autopsy in Herter's case, where the middle roots only were degenerated, though the pressure was exerted on all the roots at the level of the last lumbar nerve.

There is no way, therefore, of determining by a study of the anæsthesia alone a pressure lesion on the cauda high up from a destructive lesion in the cord at its lowest extremity.

The diagnosis may, however, be made, first, from a study of the surgical indications, chiefly of the nature of deformity, the relation of the vertebræ to the segments of the cord being remembered. The cord ends at the first lumbar vertebra, hence any fracture below that is necessarily compressing the cauda equina. Secondly, the diagnosis may be made from a study of the paralysis which accompanies the anæsthesia. This paralysis is very slight in lower cord lesions, being confined to the peronei muscles when the lesion is at or below the second sacral segment; it involves the anterior tibial and posterior tibial muscles when all the sacral segments are involved, and only invades the movements of the hip-joint when the entire lumbar region of the cord is affected.[1] In cauda lesions, on the other hand, the pressure on the nerve roots is often sufficient to produce widespread paralysis when sensation is but slightly affected.

The cases in which autopsy or operation has revealed the nature of the lesion in diseases of the lower cord demonstrate, however, that a sharp differentiation between cauda equina and cord lesions is not often justifiable. In the four autopsies here cited, both cord and cauda were invaded by the lesion, which was a meningo-myelitis with hemorrhage, the result being a destruction of the lower cord and a matting together of the nerves of the cauda in a mass of inflammatory material. It seems, therefore, questionable whether, except in cases of fracture below the first lumbar vertebra with displacement of the vertebræ, any sharp line of distinction between cord and cauda lesions should be attempted. It is chiefly in the surgical cases that operative interference has been attempted, and here, as already stated, the surgical rather than the medical facts have been the surest guides to the operation.

There is one case on record, however, of successful operation for removal of a tumor compressing the cauda equina (Laquer, *Neurol. Centralbl.*, 1891, x. 193). In this case the extreme pain in the sacral region and the tenderness over the sacral region appear to have been the particular symptoms which guided the operator; the tumor was extra-dural, and the nervous symptoms were by no means such as to

[1] For more precise statements see "Syringomyelia," THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1888.

suggest a lesion of the spinal cord. In two other cases of tumor of the cauda equina—viz., those of Simon (*Arch. f. Psych.*, 1875) and Lachmann (*Ibid.*, 1882), the characteristic nervous symptoms of compression of the cauda were wholly wanting, and the cases were not diagnosticated during life.

Some writers upon the differential diagnosis between cord and cauda equina lesions have laid stress upon the fact that sensations of touch, temperature, and pain are not always equally destroyed, and have sought to conclude that this inequality of sensory disturbance was evidence of cord lesion as distinguished from cauda equina lesion. The cases here cited of Herter and Oppenheim, with autopsies, and two of my cases, in which the operation showed the lesion to be a compression of the cauda without lesion of the cord, prove that this point of differential diagnosis is not well taken. In both cord and cauda lesions the disturbance of tactile sense may be more or less extensive than that of the senses of pain and temperature.

It is evident from the facts here presented that a careful study of disturbances of sensation is a valuable aid in the diagnosis of the situation of lesions in the spinal cord and cauda equina. It is, however, to be remembered that anæsthesia is but one of a series of symptoms entering into that diagnosis, and the condition of reflexes, and the power, tone, and electric reactions of the muscles are not to be neglected in the examination of any case. It is only when *all* the signs of a local lesion coincide that the diagnosis is an absolute one.

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RADICAL CURE OF PSOAS ABSCESS.

By R. W. Murray, F.R.C.S. Eng.,
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The treatment of psoas abscess secondary to disease of the spine has from time immemorial been extremely unsatisfactory, and even at the present day many different practices are followed.

Deckers, writing in 1693, advised opening the abscess with a trocar; he left the canula in the cavity, stopped with a *cork*, and let out the pus at intervals. Benjamin Bell adopted a similar proceeding.

Liston advised opening the abscess when it pointed, and says: "In these cases the discharge is generally profuse, long continued, and attended with exhaustion and hectic, gradually but surely destroying the patient." "Opening the cavity and shutting it up again, however carefully conducted, is in almost every instance followed by alarming and hazardous results." Lawrence and Sir Astley Cooper, on the other hand,

strongly recommended Abernethy's plan, which consisted in "puncturing the abscess obliquely, and so producing a valvular opening; evacuating the pus in a continuous stream, so that no air should gain admittance." "When the abscess is emptied as much as possible, the wound should be attentively wiped, the edges placed in exact contact and retained in that state by strips of plaster." Other writers, as Kirkland, preferred the abscess to burst of itself. Dupuytren and John Pearson both considered it dangerous to open a psoas abscess on account of the almost inevitable hectic fever.

In the present day we have much less hesitation in operating, and the treatment that is probably usually adopted is, in the first instance, absolute rest; and if, in spite of this, the abscess continues to increase, it is opened and drained from the loin, as advised by Mr. Treves, the bodies of the diseased vertebræ examined from the wound, and sequestra removed if found; the strictest antiseptic precautions being maintained throughout the whole course of the case. Some surgeons speak very highly of an injection of iodoform emulsion into the abscess-cavity; but, as Mr. Erichsen, says, further experience is required before its true value can be ascertained.

Though quite appreciating that the antiseptic method has put the treatment of psoas abscess upon an entirely different footing, still, as a matter of practical experience, the treatment usually adopted leaves much to be desired.

I am quite aware that in a number of cases the abscess has disappeared and the patient has been cured simply by means of prolonged and absolute rest. But, unfortunately, a large proportion of patients suffering from psoas abscess are of the poorer classes, and absolute rest (especially in the case of children) outside a hospital is quite out of the question. On the other hand, if the abscess is opened and drained, the discharge is so profuse and long continued that antisepsis breaks down, and the case not unfrequently terminates either in lardaceous disease or general tuberculosis.

Most favorable results are now obtained in the treatment of wounds, by closing them without drainage and applying pressure, a practice that I adopt in all suitable cases.

Last year Mr. Arthur E. Barker brought forward at the London Clinical Society some cases of psoas abscess in which he had succeeded in obtaining primary union, with obliteration of the abscess-cavity, after opening the abscess in the loin, thoroughly scraping and washing its walls, and then closing the wound without drainage. The favorable results obtained by Mr. Barker induced me to adopt a similar practice. The cases I have operated upon in this manner are four in number, and in every one of them primary union with obliteration of the abscess-cavity resulted.

In one of my cases twenty ounces of pus were evacuated; on examining the vertebræ with my finger, from the wound, a loose sequestrum the size of one's thumb-nail was felt lying in the side of one of the bodies of the lumbar vertebræ, and was removed. The walls of the cavity, lined with a thick, slimy membranous layer, the so-called "pyogenic membrane," were carefully scraped with a Volkmann's spoon until, as far as could be ascertained, the whole of it was removed, the lining walls now presenting a comparatively rough feel. The abscess-cavity during and after the scraping was thoroughly washed with a hot but weak antiseptic solution, a little iodoform dusted in, and the wound closed without drainage. Firm pressure by means of a pad of wood-wool wadding was applied over the situation of the psoas muscle anteriorly, and the thigh on the affected side was fixed. There was no rise of temperature after the operation. The wound was dressed on the following day, as the child had soiled her dressings, and again on the ninth day, when it was found completely healed, and there was absolutely no evidence of re-accumulation in the abscess-cavity. The patient was discharged in a Sayre's jacket and a hip Thomas, and when shown with the other three cases at a meeting of the Liverpool Medical Institution four months afterward, there was not the slightest evidence of a psoas abscess.

One of the other cases, a girl three years of age, on whom I operated in October, 1891, was in a most unfavorable condition, for, besides spinal caries and a psoas abscess, the child had necrosis of the frontal bone, disease of both elbow-joints, and disease of the tarsus. It is now six months since the operation, and there is not the least sign of a psoas abscess.

It certainly was somewhat of a surprise to me that an abscess-cavity containing twenty ounces of pus could be thus obliterated, but the explanation I take to be as follows: On first opening the abscess and passing one's finger into the cavity, it is, so to speak, lost in a sea of pus, and it may be only with extreme difficulty that one can make out its boundaries. After all the pus has been evacuated, the walls collapse somewhat and readily come within reach of the finger, and, after the scraping and washing with hot antiseptic solution, the walls become further collapsed, are thrown into folds, and the opposing surfaces come into contact. The "pyogenic membrane" having been removed, these folds become adherent one to the other, blood-clot replaces the pus, and in turn is replaced by fibrous tissue, and so obliteration of the abscess-cavity is completed. It is now more than twelve months since I operated upon my first case, and the child is at present in good health, and there is not the least sign of a psoas abscess.

As regards the details of the operation it is only necessary to say that strictly antiseptic precautions must be taken before, during, and after the operation. The abscess must be opened in the loin, for one is then near the seat of disease, and is thus enabled to examine the bodies of the diseased vertebræ and remove any loose sequestra. The lotion used for washing out should be weakly antiseptic but decidedly hot (about as

warm as the hand can bear), for not only does it thus cause the abscess-walls to be thrown into folds, but also arrests any bleeding that not unfrequently takes place from vessels contained in the ruptured fibrous bands sometimes found crossing the abscess-cavity.

The after-treatment, of course, should be directed to the diseased spine, which will require mechanical support, and to improving the general health of the patient.

In relating these favorable results I trust I may induce other surgeons to adopt a practice at once so simple and so satisfactory; and I am sure the profession owes a debt of gratitude to Mr. Barker for being the first to demonstrate its practicability.

LIVERPOOL, April, 1892.

GANGLION AND TENO-VAGINITIS TUBERCULOSA.

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II. TENO-VAGINITIS TUBERCULOSA.

THIS subject stands in such close relation to the foregoing one,[1] affecting as it often does the very region in which ganglia are most commonly met with, and such has been the confusion existing between true ganglion and the subject under consideration, commonly called by English physicians compound ganglion, that the two may well be considered in conjunction. Not improbably this designation "compound ganglion" has done much to increase the indefinite conception of what is meant by the term ganglion. To-day there can, however, be no doubt but that ganglion and all the forms of tuberculosis of the tendon-sheaths have nothing in common; they are separate affections, and should therefore have dissimilar names.

The preceding paragraph presupposes that true ganglion is not tubercular in origin. The possibility of such an origin is one which, as far as I know, has yet to find expression in print. Against the idea speak two circumstances: no tubercle bacilli have been found in a true ganglion, and second, a localized tuberculosis of the skin and subcutaneous structures has never been reported as following the rupture of a ganglion, an inoculation experiment. The recognition of tuberculosis of the tendon-

[1] Evans: "Ganglion and Teno-vaginitis Tuberculosa," THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, June, 1892, p. 643.

sheaths probably dates from the time of Jobert, who designated it as white swelling of the tendon-sheaths. Olav Acrel[1] first described the rice bodies, corpora oryzoidea, and the affection was then known as "ganglion crepitans Acrelii." Later on, Dupuytren's name was associated with the affection, and especially with that of the palm of the hand. Berger[2] attributes the first description to Michon, in 1851; following whom, he says, came Bidard, 1858; Cazanon, 1866; Heinecke, Notta, 1860; Barwell, 1858; Foucher, 1862; Annandale, 1865; Lanceraux, 1873.

The relation of the rice bodies to tuberculosis of the tendon-sheaths was first observed by Baumgarten.[3] Independently of him, Riedel[4] and Koenig[5] made the same discovery both for tendon-sheath and joint affections, and Hoeftman[6] found that hygroma proliferum, Virchow, was also a tubercular affection.

Tuberculosis of the tendon-sheaths may be primary or secondary; the latter form is much the more common, being usually an extension of the tubercular process from a neighboring bone or joint to the affected sheath or sheaths, but as its symptoms and its gravity are masked and thrown into the shade by the bone or joint affection, it will be to the primary form of tubercular teno-vaginitis that especial attention will be directed.

Berger divides the subject as follows:

1. Primary tuberculosis of the tendon-sheaths.
   - *a*. Acute.
   - *b*. Chronic.
     - *α*. The non-purulent form.
     - *β*. The purulent form.
2. Secondary tuberculosis of the tendon-sheaths.
   - *α*. The non-purulent form.
   - *β*. The purulent form.

1. *Acute Primary Tuberculosis of the Tendon-sheaths.*

Under this heading we would understand the development of miliary tubercles on the inner surface of the sheaths or on the tendons themselves. This form has never been described, yet the possibility of such a thing, say as part of an acute miliary tuberculosis, cannot be denied.

The chronic tuberculosis of the tendon-sheaths may, since the tendon sheath is but a closed sac with parietal and visceral layers, be either

[1] Comment. Soc. Reg. Sci. Gottingensis, tome ii. 112.

[2] Deutsch. Zeitschr. f. Chir., 1885, xxi. 335.

[3] E. Neumann: Königsberg. Arch. f. mikros. Anat., 1880, xvii. 130.

[4] Deutsch. Zeitschr. f. Chir., 1878, 45.

[5] Die Tuberculose der Knochen u. Gelenke.

[6] Ueber Ganglion u. chron.-fung Sehnenscheiden-entzündung (Hygroma proliferum, Virchow), Konigsberg, 1876.

diffuse or circumscribed. Of the diffuse form two varieties have been recognized, either of which may become purulent; they are the fungous and the hygroma forms. The circumscribed affection appears always to occur in the granuloma form. It is, however, liable to break down and infect the whole sheath. Thus it would seem better to change Berger's table:

"*b*. Chronic.
"*a*. The non-purulent form.
"*β*. The purulent form."

into—

b. Chronic.
a. Diffuse.
1. Fungous } purulent or non-purulent.
2. Hygroma }
β. Circumscribed.
1. Granuloma, purulent or non-purulent.

Taking up for consideration—

a, 1. *Chronic diffuse fungoid tuberculosis of the tendon-sheaths* (teno-vaginitis tuberculosa, chronica, diffusa, fungoidea)—a rather long name, but one, like those of modern organic chemistry, which describes what it represents: The beginning is extremely chronic, and usually no cause can be ascribed, except, perhaps, an injury. Its localization is most commonly upon the hand or foot, and in these places an isolated tendon-sheath is more frequently affected than the larger compound ones which envelop such aggregations of tendons as those of the flexors—a point of difference between this and the hygroma form. A slight swelling occurs along the tendon, and since this in the diffuse variety involves the whole extent of the tendon-sheath, this swelling slowly increases, so that after the lapse of some time, years, during which interval little or no inconvenience has been occasioned, the tumor protrudes slightly above the level of the skin.

The swelling, as Berger (*loc. cit.*) says, affecting the finger-sheaths of the flexor tendons, appears as a worm- or sausage-like tumor, which can be easily palpated, is well defined, and reaches from the middle of the palm up to the finger-tip, the finger-tip or berry remaining normal. That is, the distribution of the tumor is exactly that of the entire finger sheath of the flexor tendon. The skin over the tumor is normal. The tumor is plastic, at times fluctuating. Very little or no pain or tenderness is complained of.

As contents of the sheath we find, not what is often expected, a fluid, but a grayish-red, sarcoma-like fungus which surrounds the tendon. The entire sheath is usually completely filled, as if both the parietal and visceral layers had been affected and the growth from them had occluded the sheath cavity. The parietal layer may, however, be alone affected;

in this case there is found, at times, a central cavity filled with slimy fluid in which rice bodies may or may not be present.

The pathological anatomy of this affection is so exactly similar to that of fungous disease of the joints that a reference to the same will suffice.

Cases. Berger (*loc. cit.*) reports one case in which there existed the central cavity surrounding the tendon; the little finger was the seat (primary?) of a diffuse fungous affection of the tendon-sheath. Besides the swelling on the volar aspect of the little finger, the palm of the hand presented a diffuse, deep swelling, and the region of the wrist, dorsal and volar, was similarly affected. After an exploratory incision the case came to amputation.

Falkson (*loc. cit.*) operated upon the same individual twice; the operations were three years apart and on different hands. At the time of the second operation the hand first operated upon (the right) was functionating normally, though, at the operation, the entire sheaths of the second and fifth fingers were dissected out, and the ligamentum carpi dorsalis almost completely removed. The tendons were not affected. Union *per primam*. Three years later the left hand was operated upon, the same fingers (second and fifth) being affected in a similar manner, and the same kind of operation performed. In this case the tendons were so affected that under a stream from an irrigator they separated into bundles of fine fibres. The result of the operation was very satisfactory.

Doyen[1] reports a case of fungous teno-vaginitis of the index finger which, after two attempts at cure by Championnière, came to disarticulation. The whole sheath of the flexor tendon of the index finger was filled with a fungous material which, on microscopical examination, was found to consist of tubercles whose centres had, in part, undergone degeneration.

Beach.[2] Fungous disease of the sheath of the extensor longus digitorum of foot. Incision disclosed a mass of cheesy nodules lying in a matrix of translucent, gelatinous material, with some small pockets of a yellow fluid, all being connected with the tendon-sheath. Microscopical examination showed tubercles.

Golding Bird.[3] Over the tendon of the extensor carpi ulnaris dext. and extending three inches upwards from the insertion of the tendons, was a swelling which seemed precisely like that of an ordinary ganglion, except that it had two hernia-like projections above the general line of the tumor. On incision a solid, transparent granulation or pulpy material was found, out of which the tendon emerged. Excision, scraping. Recurrence in six months. No doubt as to its being primary. The wrist-joint was not affected.

[1] Prog. Méd., Paris, 1883, xi. 394.
[2] Boston Med. and Surg. Journ., cxx. 559.
[3] Trans. Path. Soc., London, 1888–89 xl. 244

a, 2. The *hygroma* form of the chronic diffuse tubercular teno-vaginitis (teno-vaginitis tuberculosa, chronica, diffusa, hygromatosa) is that variety which has already been mentioned as being, at times, called "compound ganglion;" ganglion crepitans Acrelii; ganglion of Dupuytren; hygroma proliferum. It is, though not a common affection, perhaps the most frequent form of primary tuberculosis of the tendon-sheaths.

As to etiology, we must here, and in the fungous variety, regard the local infection with the germ of tuberculosis as the primary cause. What the predisposing causes are it is difficult to say. Probably, in a general way, they are the same as those which predispose to other forms of tuberculosis. English writers, in this as in many other affections, have sought to find a causal relation in rheumatism and gout. As to time of life, though not limited to any age, the affection is certainly more frequent in early adolescence than in either childhood or old age.

As to localization, the region of the wrist is by far the most commonly affected part, and here, again, the sheaths of the flexor tendons suffer more frequently than those of the extensors. The exact anatomical situation is not as yet quite settled—if, indeed, it is not variable. This much, however, is certain: the sheaths of the flexors of the thumb and little finger always communicate with the sheaths of the flexor tendons which lie in the palm of the hand, while the finger portions of the sheaths of the flexors of the others fingers do not so communicate, and hence their affections may be limited, while those of the thumb and index finger almost of necessity involve the palm of the hand.

Gosselin and Michon (*loc. cit.*) assert that there are always several synovial sacs which pass under the volar carpal ligament: an ulnar sac enclosing the flexor tendons for the fourth and fifth fingers, and a radial sac for the tendon of the long flexor of the thumb, while the flexor tendons for the index and middle fingers lie between the two sacs, but possess no proper synovial envelope. The hygroma affects most frequently the ulnar sac, hence suppuration would cause stiffness of the fourth and fifth fingers. The skin over the tumor is normal and movable, except when suppurative changes have set in.

The size varies greatly. The form, however, is almost constant, as the tumor possesses the marked peculiarity of being bilocular or compound. The explanation of this is a purely anatomical one: the fluid poured out into the sheath sac distends the same, and the greatest distension must necessarily be where there is the least resistance, that is, above and below the annular ligament of the wrist. Thus these tumors are made up of two communicating sacs, one above, the other below the wrist, the one on the forearm, the other in the palm of the hand, when the tumor occupies its most common situation on the volar surface of the wrist.

region. Most usually the fluid can be pressed out of one sac into the other, causing the latter to increase in size and to become more tense.

Very frequently during this act or during simple palpation of the exquisitely fluctuating tumor, a peculiar, soft crepitation may be felt (hence the appellation crepitans), due in all probability to the presence of certain bodies known as corpora oryzoidea or rice bodies.

Lücke thinks that the cyst formation occurs from the sheath of the flexor profundus, and speaks of the difference in appearance of the palmar tumor depending upon whether the affection remains confined beneath the palmar fascia, or, penetrating the same at one or more places, causes the upper surface of the tumor to possess rounded projections. He further insists upon it that that portion of the tumor which belongs to the index finger sheath almost invariably stands out alone or buries itself beneath the muscles of the ball of the thumb.

The contents of the tumor are, as the name hygroma vel hydrops tuberculosus teno-vaginale would indicate, fluid—a clear, transparent fluid, very thin and of a specific gravity but little above that of water, thus contrasting markedly with the contents of true ganglia—and in this fluid float a greater or less number of the corpora oryzoidea. The quantity of these rice bodies varies from very many to very few—indeed they may fail entirely, and yet the affection be a tubercular and not a simple dropsy of the tendon sheath. The latter affection, simple dropsy of the tendon-sheaths, is becoming more and more rare the more frequently the cases are operated upon (Koenig, *loc. cit.*).

One point must be insisted upon: between the hygroma and the fungous forms come a variety of intermediate affections in which the relative quantity of fluid decreases as the quantity of rice bodies of both kinds, floating and attached, increases.

The pathological anatomy of this variety is, *cæteris paribus*, the same as the fungous, except that, added to the tubercular disease of the sac walls, we have a greater or less amount of fluid present. The rice bodies, which will be considered further on, may be regarded as tuberculous portions of the sac wall rubbed off by the action of the tendon. During the course of the affection, which is quite chronic, there develops a weakness of the flexors, an impairment of the function of the hand, an inability to flex the distal phalanges, and, at times, pain up the arm from pressure on the nerves.

Suppuration of the sac, with the resulting contractures, if nothing worse, is a not uncommon termination for untreated cases or for those on which palliative means have been tried.

Cases. Dr. Bennet[1] reports a case of hygromata affecting the hand; there were two large tumors, one on the palmar, the other on the dorsal

[1] Dublin Journ. Med. Sci., 1877, lxiv. 261.

surface, and each extended above and below the annular ligament. Besides these, there were other tumors on the thumb, index, and middle fingers. All crepitated distinctly, "which distinguishes them from ganglion."

Both dorsal and palmar tumors were aspirated, the rice bodies expressed, and strong tincture of iodine injected. No reaction, some thickening; the smaller tumors disappeared spontaneously, though no connection could be made out.

v. Mosengeil[1] punctured a large ganglion (hygroma) of the flexors of the hand and wrist. Little fluid, but many rice bodies were removed. Puncture repeated and case thought to have been cured.

J. S. Wright[2] reports two cases of compound ganglion of the flexor tendon-sheaths of the hand. In the one, suppuration had already taken place and the abscess pointed through the palm. The other was operated upon by incision into the sac, above and below the annular ligament, the contents being evacuated.

Rouse[3] reports a case of two years' standing in which the tumor involved the whole palm and the lower four inches of the forearm. Two small sinuses existed on the proximal side of the annular ligament, out of which semi-gelatinous, clear fluid could be pressed. Incision, under antiseptic precautions, above the wrist, and a quantity of fluid and some gelatinous material pressed out. Two months later, suppuration of the sac and amputation through the forearm.

Gerster[4] operated upon both hands of the same patient—dorsal surface of the right hand, palmar of the left. He called the affection "compound ganglion," but says tubercular material was dissected out. Bandage changed on the tenth day and the case reported as cured.

Berger (*loc. cit.*). The first of the four cases he reports is one of "compound ganglion" of the hand and wrist; operation by incision and curetting; suppuration, however, set in and amputation was resorted to.

β. Circumscribed chronic teno-vaginitis. Under this heading we have but one sub-variety to consider—the tuberose or granuloma form—teno-vaginitis tuberculosa, chronica, circumscripta, tuberosa. It is probably the only form in which the disease occurs.

The point of especial predilection is at the ends of the sheath sac, which, in part, may account for the granuloma form that the growth ordinarily assumes, for the tumors are usually sharply defined, semi-fluctuating, more or less distinctly half-round, and approximately the size of half a walnut.

[1] Archiv f. klin. Chirurg., 1870, xii. 71.
[2] Med. and Surg. Reporter, Philadelphia, 1881, xliv. 676.
[3] St. George's Hospital Reports, 1879, ix. 333.
[4] Medical Recorder, New York, 1887, xxxi. 277.

Berger[1] says that these tumors are encapsulated, and offers as an explanation for the limitation of the affection to a portion of the sheath a probable agglutination of the parietal and visceral layers, which, supposably, goes hand in hand with the growth of the tumor.

The granuloma, or if one wishes, "tubercular" form of tuberculosis of the serous membranes, is not at all unknown as affecting both the meninges and the peritoneum. If a case of circumscribed teno-vaginitis be left to itself, the tubercle is prone to eventually break down and discharge, usually in one of two directions, either through the skin, when a fistula is formed and the tendon eventually destroyed, or into the sheath sac, when a mixed infection, tubercular and purulent, of the whole, until then unaffected, tendon-sheath takes place.

Cases. Two cases are reported by Berger (*loc. cit.*). The first that of an eight-year-old girl who had, a little below and in front of the outer malleolus, a circumscribed, red, and painful swelling, the size of a quarter of a dollar. Incision showed the swelling to have been filled with thin pus and cheesy material. The tendon of the peroneus longus lay exposed in the cavity. The second case was on the back of the hand, in the region of the head of the fourth metacarpal bone. Two half-round tumors, the one the size of half a hazel-nut, the other of half a walnut, were recognizable, both semi-fluctuating; skin over them was thin but not adherent. Incision proved the tumors to consist of granulation tissue. The extensor of the fourth finger passed through the middle of them. The tumors possessed a kind of connective-tissue capsule. The tendon was apparently healthy. The capsules of the tumors were adherent to the head of the fourth metacarpal bone, which for precaution was resected. Healed in two weeks.

2. *Secondary Tuberculosis of the Tendon-sheaths.*

Here one might, theoretically, distinguish the same forms as in the primary affection. But the symptoms and signs referable to the tendon-sheath affection are so masked by the accompanying disease, that the subject has not been studied even as thoroughly as the primary form. This, however, we do know: that secondary is much more frequent than primary tuberculosis of the tendon-sheaths, and that the extension of the disease is most frequently from a neighboring bone or joint affection.

Before entering upon the diagnosis and therapy of primary tubercular teno-vaginitis it might be well to consider for a moment the pathological anatomy, especially that of the well-known "rice bodies," and finally, whether or not the tendons are affected.

For the pathological anatomy of the fungous and granuloma forms of tubercular teno-vaginitis one need but refer to the tubercular joint

[1] Deutsche Zeit. f. Chirg., 1885, xxi. 335.

diseases of similar kind, as described by Koenig in his *Tuberculose der Knochen und Gelenke.* The hygroma form has been described by Virchow under the name of hygroma proliferum.

As to the rice bodies, the first observers thought they were animals, believed they possessed motion of their own, that the affection was parasitic and due to the presence of these animals. Here may be reckoned Olav Acrel, Dupuytren, Raspail, Laennec, Biddar, and Hippolite Cloquet.

Jules Cloquet, on the other hand, shared the idea of Bosc, and says: "M. Bosc a constate que ces corps n'etaient pas des entozoaires, ainsi qu'on avait pu le penser." Those believing, as did Jules Cloquet, that the rice bodies were but organized clots, coming from the thickened and inflammatory synovia, were Bosc, Dumerel, Velpeau, Virchow, Lücke, Volkmann.

Later (see Schuchardt[1]) Hyrtl observed the fringed growths on the sac wall, and many were led to believe that these were the true origin of the bodies (Hyrtl, Meckel, Billroth, Virchow, Volkmann, Pitha-Billroth), only to be brought back again to the coagulation of the synovia theory by work done by Virchow—"chemical researches with the rice bodies," which led him to believe them to be a proteid substance, which he regarded as fibrin (*Faserstoff*), and, as coagulation was supposed to take place only in the fluids of the body, the idea naturally followed, that it was in the fluid contents of the hygroma that the coagulation occurred.

We now know, thanks to the work of Schmidt and Weigert, that coagulation does take place in the tissues, and here leads to a necrosis, the so-called coagulation-necrosis. Thus the probability, that the rice bodies are dependent for their origin on the change in the sac wall, again comes to the front.[2]

Schuchardt,[3] based upon microscopical examinations of sections of the sac wall and rice bodies, stained according to the Weigert method, maintains that common fibrin does not occur in the rice bodies, but a chemical substance related to fibrin. He also thinks that the rice bodies are but parts of the synovial membrane and sac wall, for they have exactly the same microscopical structure as have those portions of the sac which have undergone coagulation-necrosis.

The production of the rice bodies may be and probably is due, in part, to the warty outgrowths of the hygroma proliferum, but no doubt is also due to an exfoliation of the necrotic parts of the sac wall, aided by the action of the tendon, for, as Koenig has shown, in stiff joints the rice bodies do not occur.

[1] Virchow's Archiv, 1888, cxiv. 186.

[2] Neumann's (Königsberg) Archiv. f. mikros. Anat., 1880, xviii.

[3] Loc. cit.

The tendon has been supposed to remain unaffected by the tubercular changes, but later examinations, and more especially the radical operations for tubercular teno-vaginitis, have shown that, though the tendon may be said to possess some immunity, it is at times affected. Tubercles have been seen in its tissue. At other times the tendon is so changed, that under a stream of water coming from an irrigator, it breaks up into bundles of fine fibres.[1]

Further, the softening process which may occur in the fungous variety, causing pointing and the discharge of pus and cheesy material, leads, if not operated upon, to a death of the tendon, due, in all probability, mainly to the suppuration, but aided perhaps by a tubercular affection of the tendon.

DIAGNOSIS.—The hygroma form has certain well-marked characteristics which generally enable a diagnosis to be made with ease. Its chronic course, localization, bilocular, or hour-glass form, the soft crepitation and distinct fluctuation, and finally, on puncture, the escape of the rice bodies, which renders the diagnosis absolute.

The fungous variety, in both its circumscribed and diffuse forms, and especially the former, offers much more difficulty.

In the diffuse form the elongated, sausage-like, semi-fluctuating tumor confined to the anatomical limits of the affected tendon-sheath are the characteristics on which the diagnosis must be based.

In the circumscribed form we have more especially to exclude other tumors of the tendon-sheaths, such as gummata, lipomata, fibromata, etc., and often an incision alone can decide.

Between tubercular teno-vaginitis and true ganglion there ought not to be much, if any, difficulty in making the differential diagnosis, except when the ganglion occupies an unusual position; in this case puncture would settle the question.

TREATMENT.—The treatment of primary tubercular teno-vaginitis will alone be considered, as the secondary is rarely treated for itself alone, but depends upon the form of treatment adopted for the affected bone or joint.

The *hygroma form* (hygroma proliferum) was, and still is by many, treated by the application of irritants and mercurials to the overlying skin. Since the affection is now known to be tubercular in character we can readily understand the impotency of these methods.

More radical means, such as puncture, incision, the seton, and dissecting out the sac, were much feared, for the suppuration which was sure to follow some of these procedures, and might result from the others, was frequently phlegmonous in character, and amputation became too often the only hope of saving life.

[1] Falkson: loc. cit.

Thus Velpeau[1] says that synovial tumors developing on the tendons are quite dangerous. Jules Cloquet[2] says ganglia of the wrist and palm of the hand are not to be opened, on account of the danger of suppuration, gangrene, and death. Even as late as 1871 we find Frank Hamilton,[3] after a series of unfortunate cases, advising against operation.

The non-operative methods of treatment may first be considered. The first method, if it can be called a method, is doing nothing. Here the question arises, Does this form of tubercular teno-vaginitis ever undergo spontaneous cure? Reasoning from what is known of tuberculosis in general, and more especially from tuberculosis of the joints, where a similar form of disease exists, one might suppose, since the joint affections not so very rarely recover of themselves, that, at least now and then, a similar affection of the tendon-sheath might get well. But as no cure by this means is reported, we must doubt if such a thing does in reality occur. The natural tendency of tubercular affections of the tendon-sheaths seems to be, slowly but surely, from bad to worse.

Whether this tendency may not be due to a variety of local conditions, proximity to the skin covering, thinness of the sheath walls, and the free and almost constant motion of the tendon, is not known, but seems not improbable. The usual course of a neglected case of hygroma proliferum tuberculosum is, that after a time, generally years, the skin at some point over the swelling grows thin, glossy, and slightly reddened, and finally ulcerates, discharging the contents, which are usually more or less purulent and contain rice bodies. This may result in a cure, but generally starts up such an active inflammation that an operation of some kind or other is necessitated.

The other forms of non-operative treatment have for us to-day but little interest, because we know their worth. Such are the application of heat and cold, painting with iodine, mercurial ointment, marjoram oil. Caustics and the seton seem to have been but little used, probably owing to the bad results which must have attended their application. Indeed, no case could be found which had been treated by the seton, though it was recommended by Christopher Heath,[4] and but one on which caustics were employed, that of Edward Daniell.[5] "A case of ganglionic deposits situated on the tendons of the flexors of the forearm, within and upon the palmar arch." Potassa fusa was employed, and it was thought that some forty cysts were removed. The result, beyond a statement that the wound healed, is not given.

Puncture, and later aspiration, were naturally the first operative procedures; made with antiseptic precautions they are to-day without danger, and even in the pre-antiseptic period their danger, like that of

[1] Loc. cit. [2] Loc. cit. [3] Med. Rec., N. Y., 1871, vi. 9.
[4] Brit. Med. Journ., 1871, ii. 9–36, etc. [5] Ibid., 1858, 884.

other subcutaneous operations, was much less than that attending free incision.

To this form of treatment was usually added the injection of an irritant, commonly iodine tincture, very recently the emulsion of iodoform in glycerine, Garré.[1]

Good results, cures, are reported by the aspiration and iodine injection methods by Burnett,[2] Gooch,[3] v. Mosengeil[4]—a case where simple aspiration repeated once was supposed to have performed a cure (?)—Spence,[5] Skey,[6] Wright.[7]

Free incision, with or without division of the annular ligament, Syme's operation,[8] followed by drainage, was a much used method, and undoubtedly gave good results. Garré (*loc. cit.*) in speaking of the final results of this method, says the majority of the cases suffer a recurrence, either in the form of hygroma or fungus; another part of the cases die of other tubercular affections, while a third part remain well for from six to ten years. These latter cases he compares to tuberculosis of the peritoneum, where, as is known, simple incision may cause the cure.

Quite a favorité method of operating was to make two free incisions, one above, the other below the annular ligament, by this means through drainage being practicable; of late years this method has been enlarged by the addition of curetting the sac walls, that portion of the sac immediately beneath the annular ligament being scraped by means of a drainage-tube passed beneath the ligament, the scraping being effected by the holes in the rubber tube as it is drawn back and forth. See Warner,[9] Willet,[10] Campbell de Morgan,[11] Lees,[12] Ormsby,[13] Wright,[14] Rouse,[15] Copeland,[16] Donald Maclean,[17] Berger,[18] Falkson,[19] Puzy,[20] Stanley.[21]

The remaining operation, that of a truly radical removal of all the tuberculous material, though by no means new, for it is referred to by Jules Cloquet, is one which has been rendered justifiable by the antiseptic and aseptic methods of operating.

[1] Deutsch. med. Zeitg., April 24, 1890; or Abh. d. 9. Cong. Deutsch. Gesellsch. f. Chirurg., Berlin, 1890.
[2] Dublin Journ. Med. Sci., 1877, lxiv. 261.
[3] Ibid.; Jules Cloquet (loc. cit.)
[4] Archiv. f. klin. Chirurg., 1870, xii. 71.
[5] Brit Med. Journ., 1871, ii. 9, 36, etc.
[6] Lancet, London, 1870, ii. 285.
[7] Med. and Surg. Reporter, Phila., 1881, xliv. 676.
[8] Practice of Surgery, 1866, 283.
[9] Jules Cloquet, loc. cit.
[10] Brit. Med. Journ., 1871, ii. 9, 36.
[11] Ibid.
[12] Ibid.
[13] Med. Press and Circular, 1881, xxxii. 26.
[14] Loc. cit.
[15] St. George's Hospital Reports, 1879, ix. 333.
[16] Am. Journ. Med. Sci., 1881, 143.
[17] Trans. Am. Surg. Assoc., 1884, ii. 521.
[18] Deutsch. Zeitschr. f. Chirurg., xxi. 1885, 335.
[19] Arch. klin. Chirurg., xxxii. 1885, 38.
[20] Lancet, London, 1886, ii. 1074.
[21] Med. Times. London, 1852, n. s., v. 262.

The operation is very simple in its description but tedious and difficult to perform. The sac is laid open, split from end to end, then with the forceps and curved scissors the affected membrane is dissected off. Iodoform, drainage and bandage. The results are good. See Beatson,[1] Cloquet,[2] Howse,[3] Gerster,[4] Weinlechler,[5] Bond,[6] Golding Bird,[7] Berger,[8] Falkson,[9] Garré.[10] As to the *treatment of the fungous variety*, both diffuse and circumscribed, what has been said of the methods of treating the hygroma form holds true—that is, with certain limitations, for, owing to the nature of the tumor, puncture, aspiration, and simple incision are here not applicable. So, after the use of topical applications, the next step is to the removal of the growth, hence, probably, the "noli me tangere" reputation these tumors have enjoyed.

Of operations for the removal of the fungus but two are used, the curetting and the excision. The formal excision can but appeal to every surgeon as being much more likely to remove all, every trace, of the tuberculous material. It has been urged by Garré (*loc. cit.*) that the fungus is too tough and fibrinous to be either easily or successfully removed with a sharp spoon; whereas the enucleation is not difficult, and the tendon can almost invariably be saved. Garré (*loc. cit.*) had operated upon nine cases with the best results; in some there had been no return after seven years. See Doyen,[11] Beach,[12] Symonds,[13] Golding Bird, Berger, Falkson, Koenig, Volkmann (*loc. cit.*).

NOTE.—Since the writing of the paper, January, 1891, there has appeared, in the *Beitr. z. klin. Chir.*, Tübingen, 1890–91, vii. 293, an article by Prof. Garré, on the primary tubercular inflammation of the tendon-sheaths, in which some forty cases are reported.

In August, 1891, while on duty for Dr. Ransohoff, at the Cincinnati Hospital, it was my good fortune to have the opportunity of operating upon a case of the fungous variety affecting the extensor tendons of the right wrist of a colored girl, aged seven years. The growth was excised, and with it the posterior ligament of the wrist, which also had become involved, though the joint itself was healthy, and the tendons cleaned; continuous suture; no drainage; first bandage changed in fourteen days; result perfect.

[1] Journ. Anat. and Phys., 1879, xiii. 449.
[2] Brit. Med. Journ. 1879, ii. 9, 36, etc.
[3] Loc. cit.
[4] Med. Rec., N. Y., 1887, xxxi. 277.
[5] Ber. d. k.-k. allg. Krankh., Wien, 1888, 232.
[6] Practitioner, 1890, xliv. 440.
[7] Trans. Path. Soc. London, 1889, xl. 244.
[8] Loc. cit.
[9] Loc. cit.
[10] Loc. cit.
[11] Prog. Méd., Paris, 1883, xi. 394.
[12] Boston Med. and Surg. Journ., cxx. 559.
[13] Trans. Path. Soc. London, 1887, xxxix. 447.

LEAD-POISONING WITH SPECIAL REFERENCE TO THE SPINAL CORD AND PERIPHERAL NERVE LESIONS.

By Edward D. Fisher, M.D.,
NEW YORK.

In recording this case, I do so with the object of adding to the testimony already collected in support of the general rather than the local affection of the nervous system by lead-poisoning.

Many cases have now been recorded in which microscopical investigation has revealed that the central nervous system is involved, as well as the peripheral nerves.

The question as to whether the former is secondary to the latter, is still unanswered.

Those favoring the central disease as the primary cause of the peripheral lesions, claim that disease of the anterior gray matter of the cord exists, although not apparent to our present modes of examination.

It would, however, seem reasonable to suppose, as Pal has suggested, in his monograph on multiple neuritis, that toxic agents such as lead, alcohol, arsenic, etc., act simultaneously on the whole nervous system, especially involving, perhaps, the peripheral nerves, but also involving the central nervous system.

In such cases, however, where recovery does not take place early in the disease, that is, in those pursuing a chronic course, or when the toxic agent is still in force, it would appear that the central nervous system becomes affected, and its disease manifests itself in well-recognized organic and systemic diseases.

This explanation would seem to accord with the clinical history of many of the cases of multiple neuritis, especially of alcoholic origin, when so-called pseudo-tabes and psychical derangement are prominent symptoms.

A basis for this permanent condition is not infrequently found outside of the peripheral nerves in disease of the meninges and substance of the brain and cord.

Present investigation would indeed seem to show that disease strictly limited to certain systemic tracts, so called, is rarer than formerly supposed, and that a diffuse affection of various columns and of various areas is common. This would seem also the more reasonable, as clinically, even in such a frequently observed and familiar organic disease as tabes, many symptoms are either absent, which are considered diagnostic of the disease, or again, others are present which are directly opposed to the situation of the lesion in the posterior columns. There has never been any

[1] Read before the American Neurological Association at its annual meeting, Washington, September 8, 1891.

satisfactory explanation, to my mind, of the selection of certain tracts with limitation to their sole environment by disease of infectious or toxic nature. The common selection of the upper extremities, as the seat of disease in lead-poisoning, and especially of the extensor group of muscles of the forearm, and those of the hand, may possibly be explained on the ground that those muscles are especially exposed to over-use.

I have observed that those cases of lead-poisoning more strictly limited to the muscles of the hands, resembling in its distribution that of progressive muscular atrophy, are usually difficult of cure, if indeed much improvement takes place at all. I have considered that in these cases, a spiral lesion involving the anterior horns was probably present, although hitherto unable to support the theory by autopsy.

The present case, which I now present, was of that nature, and the findings would seem to support my clinical deduction. In lead-poisoning, however, we do not always find the paralysis limited to the upper extremity. The lower extremities may be affected, or the paralysis may be hemiplegic in its distribution. Buzzard, in his work on *Disease of the Nervous System*, Lect. XXV., on "Some Points in the Diagnosis of Lead Palsy," relates:

> A woman, aged twenty-five years, had paralysis of the forearm and hand muscles of the right side, and of those of the leg of the left side, with foot-drop. There was loss of faradic response, and a reaction of degeneration to galvanism; the left forearm also showed less response to faradism than normal, although no paralysis had been demonstrated. The case ended in recovery.
>
> In a second case, also a woman, with paralysis of all the extremities, there was loss of patellar reflex, and loss of reaction to both faradism and galvanism.
>
> A third case, a sign-painter exposed to lead, and exhibiting the blue line (although not a very characteristic one), presented at first a weakness of the left forearm and both legs, and later, of the right forearm, although the right side showed no perceptible alteration. There was also wasting of the interossei of the left hand. There was loss of excitability to faradism in the wasted muscles, and in the supinators. (From this latter fact, Dr. Buzzard mainly makes the diagnosis of progressive muscular atrophy.) The autopsy revealed "extensive atrophy of the large ganglionic cells in the anterior horns (more marked on one side than the other), in the cervical and dorso-lumbar regions, together with what was apparently a commencing overgrowth of connective tissue in the lateral columns.

I have related the last case quoted from Dr. Buzzard rather fully, as in many respects it resembles my own, and as supporting the theory of the affection of the central nervous system in lead-poisoning. The etiology in this case I would ascribe to lead, and would therefore differ from the author as to the diagnosis.

I will briefly give the history of the case on which I have based this paper:

A. E., painter, first seen June, 1890. Family history negative. *Previous history:* He has worked at his trade since the age of thirteen;

when twenty-one he had an attack of painter's colic, with some weakness of the arms. Two years later he had a second attack, since which time there have been several mild attacks. For the past two years he has become progressively weaker in his hands, which have become wasted, so that he is unable to hold his brush. Three months ago, he had an epileptic seizure, in which he lost consciousness, and was taken to Bellevue Hospital. He remained there for three months, and improved but slightly.

Present condition: Patient anæmic, and sallow. Complains of weakness in both forearms and hands, especially of the latter, which present the appearance seen in progressive muscular atrophy. Heart hypertrophied; radial arteries, as also the temporals, show high tension. Eyesight poor; patient is unable to read well unless with a bright light. Ophthalmoscopic examination by Dr. C. S. Bull showed the following: R. E., 20/xxx; L. E., 20/c; irregular hemianopsia, the nasal half of the field being intact. R. E.: Exudative neuro retinitis, with intense exudation over the disc and neighboring portions of the retina. L. E.: Atrophy of the optic nerve and retina, with occlusion of some of the vessels. Suspected degenerative nephritis. Examination showed marked loss of power in both forearms and hands, more marked on the right side. Great atrophy of the interossei, and of the muscles of the ball of the thumbs. Grasp feeble; no tremor; able to extend the hand with great difficulty. Sensation lowered to heat and cold, and to touch and pain, and, to a slight degree, to the faradic current. Electrical examination: The extensors of the forearm show excitability to the faradic current, but much reduced. Supinators unaffected. Muscles of the hands, the interossei and opponens pollicis show no response to faradism. There was a loss of excitability to galvanism, but no reaction of degeneration. There was no affection of the lower extremities, nor was there rectal or vesical paralysis. Reflexes were normal; no pain on pressure along the course of the nerve or in the muscles. Urine: sp. gr. 1008; albumin.

He was put on potass. iodid. and iron, with galvanism, three times a week.

There was no change in the condition of the muscles during the following ten months, either in power, or in response to the electrical currents; but as the Bright's disease progressed, he entered Bellevue Hospital again, where he died, March, 1891.

Autopsy.—Heart hypertrophied; lungs normal; kidneys the seat of interstitial nephritis; brain normal, except that the arteries were the seat of atheromatous changes. The cord, including the cervical and upper dorsal portions, and the musculo-spiral nerve were hardened in Müller's fluid, and examined microscopically by Dr. W. Coleman, of the Loomis Laboratory. The peripheral nerves were markedly degenerated. The cord at the upper dorsal region showed some atrophy of the anterior horns, especially of one side, and also of the antero-lateral tracts of that side. In certain levels, there was evident sclerosis of the column of Goll, and also in Lissauer's tract there was thickening of the meninges and of the bloodvessels. In the substance of the left anterior cornua there was an apparent breaking down, leading to loss of substance. This was probably increased artificially in the examination. The anterior nerve roots also showed degeneration. While these changes are not extensive, still the evidence is clear, of a slow, progressive, degenerative process.

We have, then, changes indicative of sclerosis, disseminated in character. The whole body was evidently the seat of like changes, as shown in the arteries and kidneys.

This case is somewhat similar to the one recorded by Pal, both in its history and microscopical findings—see his monograph on *Multiple Neuritis*.

CASE IV. The patient, aged twenty-one years, showed in his first attack, colic and convulsion. A transient paralysis of the right abducens and facial, and later, of the left side. Papillitis on both sides. Hemorrhage in the right eye, the vessels, especially the veins, being strangulated. Patient could distinguish light from darkness; upper extremities ataxic and weak; lower extremities, atrophic; patellar reflex absent. Sensibility reduced.

Autopsy.—Showed partial degeneration in the optic, oculo-motor, abducens, facial, right radial, and left peroneal. The cord showed degeneration of the white columns of a disseminated character, as also of some of the cells in the anterior horn, and the posterior nerve roots.

In conclusion, if I understand the author correctly, he finds in his case a disseminated sclerosis, all the tracts of the cord being affected in different areas, and from this, and other cases, he holds that multiple neuritis affects the nerves in the tract of the cord in the same manner as it does the peripheral nerves.

From the literature of the subject (for reference to which I would refer again to Dr. Pal's monograph), and from the case I have referred to, it is evident that the various toxic agents, as arsenic, lead, alcohol, etc., cause multiple neuritis, involving at times the upper and lower extremities, although with each individual agent certain regions are more often selected; and also that with the peripheral lesion there is not infrequently associated organic lesions of the central nervous system.

The frequent association of cranial nerve lesions in lead-poisoning, as well as from other toxic agents in which we find changes in the nerves or their nuclei, should have prepared us to expect like lesions in the gray matter of the cord, and as these paralyses sometimes occur with disease of the nerve alone without the involvement of the nuclei, so, to carry out the analogy, it would seem impossible for it to be otherwise in the relation of the peripheral nerves to the spinal cord.

An interesting question is suggested by Pal in reference to the trophic dependence of the motor spinal nerves to the cells of the anterior horns. He finds that in some cases of atrophy of the cells, no degeneration of the nerve fibre followed. The subject would lead me into a discussion of poliomyelitis, which has already occupied considerable of the time of the session, and therefore I will only say that this sustains again the fact of the simultaneous affection of the peripheral and central nerves as well as their individual, and, at times, exclusive disease.

IMMUNITY FROM PHTHISIS AS AFFECTED BY ALTITUDE IN COLORADO.

By C. F. Gardiner, M.D.,
of Colorado Springs.

In the climatic treatment of pulmonary phthisis, altitude, combined with sunshine and a minimum rainfall, undoubtedly to-day holds the first place, and in the average cases of phthisis offers the best chances of recovery. The immunity from phthisis which these climatic conditions confer upon the inhabitants of such regions, and the death-rate from phthisis, as compared with communities at low elevations, as on our seacoast, etc., must bear a direct relation to the value of this climate in the treatment and cure of the phthisical. In collecting for comparison cases of phthisis at an altitude which have developed there, care must be taken not to include cases that came to the country with symptoms of the disease; cases should be taken which have lived at least several months in fair health under these climatic conditions before developing phthisis.

It was at one time supposed that a race who lived at and over 6000 feet altitude, such as Colorado, the Mexican Plateau, Valley of the Andes, and similar elevations elsewhere, never did develop phthisis unless they removed to a lower altitude, one writer even going so far as to limit the non-phthisical line at a certain altitude (Kuchenmeiser).

As regards the highlands of the United States, this was no doubt true in the past, as, until within a very few years, our whole country—in the West at least—was very thinly settled and the only statistics we had were from army surgeons, and their experience was largely confined to observation upon the natives or white men who, like most pioneers, were above the average physically, and, in addition, lived a vigorous outdoor existence—a life that would confer immunity from phthisis in far less favored regions. As time has gone on, however, towns have sprung up all over our dry and elevated regions. Sedentary occupations have replaced outdoor ones, and the crowding of towns and villages has taken the place of the scattered camp of the cowboy and hunter, and, as a consequence, non-imported phthisis is not now an unheard-of thing.

In taking statistics from a town as a standard of comparison, it was thought that the result would be more useful than reports from a large section of country, as the condition of a town regarding occupations, manner of life, etc., would more closely approximate to conditions of towns at low altitudes, than would a comparison between agricultural or country life in different sections—as, for instance, the life of Colorado ranchmen differs materially from that of a New England farmer. These statistics have been taken from Colorado Springs, a town situated at an

altitude of 6000 feet, with a sandy soil, good natural drainage, rainfall of about 15 inches per annum, with a mean relative humidity of 51. The streets are broad, well planted with trees, and the dwellings as a rule are not built into blocks.

Certain conditions, however, favor direct phthisical contagion, as in many instances the inhabitants are either phthisical or have recovered from phthisis, or at least have a marked phthisical family history, thus making the town, as a community, most liable to phthisis from a standpoint of hereditary influence and direct contagion. The well ones are frequently closely confined with the sick, with the attendant anxiety, work, and worry, and there are many houses in which numbers of people have died from phthisis. From the dryness of the air there is a fair quantity of dust distributed by the wind in the streets, and there is no doubt that any precautions regarding dried sputa are confined to the exceptionally intelligent minority.

To balance these dangers there is, of course, first, the physiological effect of the climate as an antidote and direct tonic, the clear weather which encourages life out of doors, the sandy soil, and the increased diathermancy of the atmosphere and almost constant sunshine, which possibly act in that way as a germ-destroyer far more vigorously than in humid climates. Koch is quoted as saying that tubercle bacilli are killed by direct sunlight in a pure culture.[1]

But, taken merely as a town, apart from any immunity due to climatic conditions, there is no doubt that, as a community, the town, from the very nature of the inhabitants, is most eminently calculated to spread the seeds of consumption broadcast; and, if the bacteriologist is right, and consumption is spread from the sick to the well by the means of dried tubercular sputa, then this town ought to show a large number of primary cases of phthisis annually, or else there is some powerful agent at work preventing infection, due to the climate. If the same conditions for infection existed in a town at a lower level, as on the seacoast or inland rivers, and phthisical affection did not occur much more frequently there than in the average town, then contagion from phthisis would be considered a myth and not worth considering.

The following cases have been collected from the physicians of Colorado Springs. In each case the evidence has been carefully sifted, and, in every instance, the physician who treated the case has been personally interviewed in regard to it. The relatives of many of the patients have also been cross-examined. In some of the cases several physicians saw and treated the patient, and it is needless to remark that, in a resort for consumptives, the physicians are specially trained

[1] "Observations on Tuberculosis and the Diagnostic Value of Tubercle Bacillus," by Henry Sewall, M.D., Ph.D., Denver, Col. Medical News, July 25, 1891.

in the diagnosis of phthisis, and a primary case excites great interest from its rarity. The histories are far from perfect, being, in several cases, entirely supplied from memory, and, with one exception, there was no sputa examination made—in fact, the majority of the cases occurred before this was generally used as an aid to diagnosis; but, even with these drawbacks, they are certainly as accurate as the average statistics, if not more so.

The cases cover a period of about fifteen years. The town in 1875 had nearly 3000 inhabitants, which increased steadily until 1884–85, when there was a sudden increase in population of about 20 per cent. In 1890 there were 12,000 inhabitants.

Case I.—Male, aged thirty years; strong physique; had lived in Colorado Springs eight years; occupation, private secretary, but in this occupation was often half of his time out of doors; no family history of phthisis whatever, and, as far as was known, was not exposed in any way to direct contagion, being a large part of his time in the outskirts of the town proper. Symptoms came on slowly; thought he was bilious; loss of appetite; dyspepsia; some loss of flesh; slight cough; no fever. Physical examination: On left third interspace had aërial or bronchial respiration, whispering bronchophony, and below on this side an area of coarse râles; heart normal. Ten months later owing to a fire in the house in which he lived, he became excited, over-exerted himself, and had a profuse pulmonary hemorrhage. Not improving in Colorado, and thinking a complete change might be of benefit, he spent the winter in the West India Islands, and was somewhat improved, but, upon his return in the spring to Chicago, had a sudden and violent pulmonary hemorrhage, which was fatal, some three years after first symptoms of disease appeared (1889).

Case II.—Male, aged twenty-two years; fair physique; had lived in Colorado Springs one year; occupation practically a cowboy; had a marked phthisical family history, one sister having died in Colorado Springs of the disease. While riding, he was thrown violently from a horse, which resulted at once in a profuse pulmonary hemorrhage, and he died of acute phthisis after a few months, in 1882.

Case III.—Woman, aged twenty-eight years; strong physique; Irish; had lived in Colorado Springs three and a half years; family history unknown; no case of phthisis in the house in which she worked. Was taken with an obstinate cough; had moist râles at left upper apex, and the disease gradually extended through left lung and into other lung; she, in the meantime, bore one child; had puerperal fever, and, at a later date, typhoid fever, there being some uncertainty regarding the latter, as to whether it was acute tuberculosis or typhoid fever; she finally died of acute phthisis two years after first symptoms had appeared; no hemorrhage (1886).

Case IV.—Male, aged thirty years; good physique; had lived for two years in Colorado Springs; occupation, harness maker; family history unknown. First had a case of typhoid fever; convalescence was tedious, and he began working at his trade in a weak condition, working in a small, badly ventilated room with five other men; he slept in the same room at night; developed a hacking cough; loss of flesh and

strength; had râles over both apices. He went to California and lived there several months; came back to Colorado worse than before he left; then he finally returned to his home in Pennsylvania; result unknown; no hemorrhage (1882).

CASE V.—Male, about thirty-five years old; family history unknown; good physique; Irish; had lived in Colorado Springs three or four years; occupation, day laborer; lived in a very bad hygienic condition, in small room badly ventilated, and had poor food. Developed a hard cough, with profuse expectoration, with mucous and subcrepitant râles over both lungs. Had fever and loss of weight. He in a few months left Colorado Springs, with the disease progressing rapidly; he had no hemorrhages; further history unknown (1885).

CASE VI.—Male, aged twenty-two years; good physique; residence in Colorado Springs fifteen years; occupation, clerk in drygoods store; had a strong family history of phthisis, one sister having died of the disease in Colorado Springs. He was a member of the volunteer fire company, ran numerous foot-races, and while training for the latter broke down and developed phthisis; physician in charge said it was a typical case of the disease, but had no notes to refer to; death occurred after about three years from the time first symptoms occurred; no hemorrhages (1887).

CASE VII.—Male, aged twenty-one years; fair physique; cousin of the above; family history of phthisis (mother died of the disease in Colorado Springs in 1882); had lived in Colorado Springs fifteen years; occupation, clerk in gentlemen's furnishing store. Was a member of the volunteer fire company; developed phthisis gradually and was sick, in all, two years; during the last three months intestinal tuberculosis was present; had no pulmonary hemorrhages (1889).

CASE VIII.—Male, aged twenty-two years; good physique; family history unknown; had lived in Colorado Springs ten years; occupation, printer. Was a member of the volunteer fire company; developed symptoms of phthisis gradually, and, after two years, died in 1890; no hemorrhages.

CASE IX.—Female, aged twelve years; had lived in Colorado Springs five years; family history unknown; ran down, with cough, fever, and loss of flesh; an area of consolidation over left lung anteriorly; moist râles over the rest of this lung; this continued for nearly a year, when gradually complete recovery took place; no hemorrhages (1886).

CASE X.—Female, aged thirty years; good physique; residence in Colorado eighteen years; no occupation; family history phthisical; grandmother, father, and two aunts had phthisis. She first had a walking case of typhoid fever in 1888; later, in March, of the same year she began to lose flesh and appetite, with a temperature of 101°. Physical examination: Dulness over three-fourths of the upper left lung anteriorly and posteriorly; expectoration scanty; mucoid in character; was not streaked with blood; for six to eight weeks there was progressive consolidation of left lung; then the condition was slightly better for a time, but in August 1889 the whole lung became involved and the right lung also became diseased; the sputa was crowded with tubercular bacilli, and death took place late in 1890, with fever, emaciation, diarrhœa, etc.; the patient had never been out of Colorado Springs or El Paso County for eighteen years, and was in excellent health until

1888; her father died in Colorado Springs in 1887 of tubercular laryngitis.

None of the above cases, as far as known, had been away from Colorado for several months prior to developing the first symptoms of the disease, and the majority had certainly never been lower than 5000 feet altitude since coming to Colorado.

It is nearly impossible to draw any relation between these cases and the population of Colorado Springs, as we are dealing with a phthisical community, and do not know with any certainty the exact proportion between the phthisical and non-phthisical. In regard to the relations between altitude, population, and phthisis, Hirsch, in his *Historisch-geographischen Pathologie*, gives some interesting statistics quoted from Corval, in the Grand Duchy of Baden. The mortality from phthisis in the towns increased in proportion to the number of inhabitants. He divides them into groups:

Group No. 1. Towns of 330 to 1000 feet altitude, average mortality from phthisis, 3.36; mortality in villages of less than 3000 population, 3.11; with over 3000, 4.5.

Group No. 2. Towns of 1000 to 1500 feet altitude, average mortality from phthisis, 2.75; towns of less than 3000 population, 2.73; more than 3000, 3.8.

Group No. 3. Towns of 1500 to 2000 feet altitude, average mortality from phthisis, 2.16; less than 3000 population, 2.49; more than 3000, 4.99.

Group No. 4. Towns of 2000 to 2500 feet altitude, average mortality from phthisis, 2.71; more than 3000 inhabitants, 4.72.

Group No. 5. Towns of 2500 to 3000 feet altitude, average mortality from phthisis, 2.31; less than 3000 inhabitants, 2.29; over 3000, 3.6.

Group No. 6. Towns over 3000 feet altitude, average mortality from phthisis, 2.17. All towns of this altitude were under 3000 inhabitants. Towns under 3000 inhabitants are freer from phthisis, it being a legitimate inference that in the smaller towns under 3000 inhabitants the occupations are more inclined to agriculture; in towns over 3000, to industrial occupations, with a proportionate increase of phthisis.

The endeavor has been made, even with the extremely limited facilities at command, to make at least a rough guess at the annual rate of mortality from phthisis among those of the inhabitants who did not come here for their own health and are practically non-phthisical. Those who have had phthisis and recovered are not included among these, but are classed as phthisical. One hundred and nine houses were selected at random, the inmates of which, amounting to 552 persons including servants and children, were known. The number embraced all stations of society, and included many different forms of sedentary and out-of-door occupa-

tions. The result showed one case of imported phthisis to every six healthy people. If this result is approximately true of the whole town, and we estimate an average population of 5000 people each year for fifteen years, after deducting the imported cases of phthisis from the population, we shall have an annual mortality from phthisis among the non phthisical of $\frac{13}{100}$ per 1000. The only basis of comparison I had being mortality statistics, I have considered all the ten cases in calculating the mortality, although, as a matter of fact, one recovered, and in two cases the result is unknown. But practically the result is the one desired, viz., the number of cases originating here. As compared to the $\frac{13}{100}$ per 1000 found here, the average elsewhere in all towns, cities, etc., is 3 per 1000. Even Switzerland, with the advantages of altitude and agricultural occupations, has a rate of $1\frac{86}{100}$ per 1000 originating there. Contagion certainly plays an important part in the transmission of phthisis. Cornet has shown that among the natives of Mentone there has been an increase of phthisis, due to the increase of consumptive patients who spend the winter there, and who thus transmit the disease to the peasants. W. H. Geddings, of Aiken, South Carolina, has reported cases of phthisis in women who wash clothes (more especially handkerchiefs) of those suffering from consumption. Tindal, in an article in the *Fortnightly Review*, September, 1891, mentions a clear case of contagion from father to daughter occurring in the country in Switzerland. Both inhabited the same room. The father expectorated on the floor, from which, when brushed by the girl, clouds of dust were raised. When first seen, the girl was a fine specimen of health. One year later she developed the disease and was the first to succumb.

Conditions like the above certainly have occurred again and again among the non-imported cases here reported in Colorado Springs, and yet it is a peculiar fact that, with one exception, not one of the ten cases here reported was exposed to phthisical contagion, nor, as far as can be ascertained, lived with anyone with phthisis, or had lived with or nursed anyone sick with that disease for a long time before developing phthisis; not one had an occupation that brought him in contact with the sick—facts in striking contrast to the history of most of the healthy people of this community. It is only fair to note in this connection that my figures have been based upon a population that is more or less a transient one, and possibly some exposed to contagion have developed the disease after leaving here, especially as there seems to be reason to believe that in some cases the disease may lie dormant for possibly months without symptoms. The conclusion drawn, however, is that this climate decidedly modifies contagion, and does so far more thoroughly and effectively than statistics show to be true of any other climatic resort, at least as far as I have been able to ascertain.

METAL-TURNERS' PARALYSIS.

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The attention of the writers was called to the form of paralysis for which the above title suggests itself by a case of recent origin, seen by both after having been referred to the former by Dr. Hooker, of Springfield. The case seemed not to fall under any recognized type, although the region invaded was that of the ulnar nerve, and the position of the hand that of ulnar paralysis. The uncertainty regarding the origin and prognosis of the trouble was dissipated by the history of a second case, seen shortly afterward by both the writers, in the Neurological Department of the Massachusetts General Hospital, to which he applied for treatment. This recalled a former similar case, treated in the same department, concerning which some doubt had existed at the time of his admission. All three of these patients being brass-workers, it seemed probable that the nature of the employment was to blame for the trouble. The disorder consists, briefly, in complete atrophy of the muscles of the left hand supplied by the ulnar nerve, with very slight sensory disturbance (numbness) and slight dull pain and tenderness over the ulnar nerve, the pathological process being probably neuritic, though of a somewhat peculiar type. The practical point for the clinician is the distinction between this disorder and progressive muscular atrophy, as the second case we have to report shows a standstill for fifteen years, the maximum of the disturbance having been reached in four months after the onset.

Case I.—This was the case of a young man who had been a brass-worker for a number of years, but who had discontinued this occupation on account of the disability for which he consulted Dr. Hooker, who naturally feared progressive muscular atrophy. Four months before coming to Boston he noticed a recurrent numbness in the little finger of the left hand, principally subjective, and lasting a day or two at a time. This finally became continuous and affected all the fingers of the left hand. There was no paræsthesia. There followed awkwardness in using the hand, and weakness, which caused him to leave off work one month ago. There has been no pain, excepting occasionally a dull ache in the forearm. The right hand is unaffected.

Physical examination shows that a light touch is not felt on the little and ring fingers, both sides of the ring finger being affected, though the

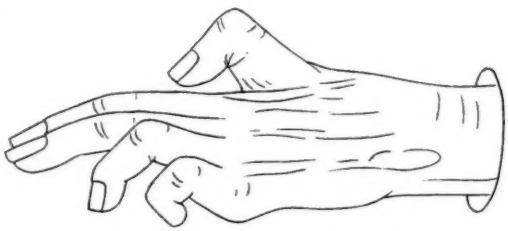
ulnar side is more markedly so. The little and ring fingers are drawn up, the index and middle fingers comparatively straight. The interossei and thenar muscles are wasted. The thumb is fixed in a position of flexion, although some flexion is possible and opposition is unaffected. Adduction is impossible. Flexion and extension of the fingers and wrist are unaffected. The interossei and thenar muscles show no reaction to faradism or galvanism. There is no fibrillary twitching, and no history of this symptom having existed. There is a slight tenderness over the ulnar nerve at the elbow.

A diagnosis of probable neuritis was made, and a guarded prognosis given as regards recovery; but the chances were stated to be against progression, though not with confidence, on account of the resemblance of the case to progressive muscular atrophy. The patient was put upon nux vomica, and galvanism was applied. The treatment was discontinued, however, on account of the disappearance of the patient.

The second case was seen not long after, and its duration seemed to establish the prognosis of these cases with sufficient certainty to render this contribution a practical one to the clinician, in one respect at least.

Case II.—M. O'D., about sixty years of age, was referred to the Neurological Department of the Massachusetts General Hospital, where he was seen by both the writers. He has worked in brass thirty-eight years, at an average of ten hours a day, having been employed most of the time at the lathe, although he has also been out jobbing.

He first noticed the trouble fifteen years ago; it reached its maximum in four months, and has remained stationary ever since. He first noticed difficulty in using the thumb of the left hand; then the ring and little fingers became bent, and could not be straightened. At first there was a slight pricking and tingling in the little finger and a dull ache and tired feeling in the ulnar side of the forearm. The latter sensation has persisted up to the present time, although the paræsthesia has disappeared.



Examination shows a slight tenderness over the ulnar nerve at the elbow, pressure upon which point sends a pricking into the little finger. The lightest touch is everywhere felt, though the sensation produced seems to him a little unnatural—"tingly"—over the region supplied by the ulnar nerve. All the interossei and thenar muscles are atrophied, and have lost electrical excitability, excepting that of the opponens pollicis. The hypothenar muscles are wasted, and have lost their electrical excitability. The little and ring fingers are in a state of flexure, most

marked in the little finger. The first and middle fingers are comparatively straight, though they cannot be moved from side to side by the interossei. Flexion and opposition are the only movements possible in the thumb.

The accompanying illustration, drawn from the second case, represents fairly the left hand in each of these cases, and is seen to be practically that of ulnar paralysis. No treatment was advised, on account of the long standing of the case.

It would seem that these cases fall rather under the head of neuritis than under any other class.

The first of the two patients worked almost altogether at the lathe, and the second worked there a great part of the time, though he also did jobbing work outside.

Judging by the constrained position of the left hand in using the lathe, as illustrated by both patients, it seems probable that this is the part of the work at fault. It is certainly improbable that the metal worked upon has any bearing upon this affection in a toxic manner, especially as the trouble is purely limited to the left hand. Whether the fault lies simply in overstrain of the interossei and lumbricales or in neuritis set up by the muscular pressure exercised on the ulnar nerve when put upon the stretch by the flexion of the elbow, it is hard to say. If the former alone, it would seem that all should be affected and the hand assume rather the typical claw shape common in progressive muscular atrophy, instead of the first two fingers being straight, as in ulnar paralysis, through the exemption of the first two lumbricales, supplied by the median. The atrophy is too marked to admit of its classification under occupation neuroses. Its course would seem to be to reach a maximum in about four months, but to progress no further.

Whether this affection is allied to the multiple neuritis (probably toxic) among brass-workers, reported by Suckling,[1] is questionable.

THREE CASES OF TRAUMATIC HYSTERICAL PARALYSIS, OF TWENTY-NINE, TWENTY-EIGHT, AND TWENTY-NINE YEARS' DURATION RESPECTIVELY IN MALES.

A CONTRIBUTION TO THE PROGNOSIS IN TRAUMATIC NEUROSES.

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However much opinions may differ amongst neurologists regarding the nature of traumatic neuroses, still greater difference of opinion exists concerning the prognosis in such affections. While some believe that

[1] British Medical Journal, December 15, 1888.

the tendency of all cases is toward recovery, and that the great majority do recover at a comparatively early period after the cessation of unfavorable surrounding influences, such as litigation, others maintain that the tendency of the affection is in the opposite direction, and that the pathological condition disappears, if at all, only after a prolonged existence.

I therefore wish to put on record three cases, two of which have already persisted twenty-nine years, and one twenty-eight years, as instances of the extreme length of time that such disabilities may persist, and that without obvious external cause therefor. These cases are the more remarkable because they belong to the so-called hysterical type, are of the male sex, and have, so far as can be judged, maintained their original form without the development of secondary pathological conditions.

One of them is an example of hysterical hemianæsthesia and hemiplegia, and two are instances of monoplegia.

I have already reported,[1] in conjunction with Dr. John C. Blake, a case of hysterical monoplegia of very severe type, which recovered about three months after the conclusion of the suit for damages, and which, therefore, represented the other extreme, or the possibility of rapid recovery.

The notes in two of the three cases are not as full as is desirable, but, nevertheless, I think I am justified in saying that, notwithstanding the incompleteness of the records, the cases were examined with sufficient care and detail to put the diagnosis beyond reasonable doubt.

CASE I. *Hemiplegia and hemianæsthesia of twenty-nine years' duration.*—The patient was first examined May 12, 1886, and again five years later—March 11, 1891. The area and depth of the *anæsthesia* at the time of these two examinations showed marked differences. At the first examination the absolute loss of the sense of touch and of pain was limited to the left arm and leg. In the arm it extended from the hand upward to a limiting line as high as the middle of the upper arm, and in the leg as high as the middle of the thigh. Over the remainder of these limbs sensation was "somewhat" diminished only; over the body sensation was apparently normal—at least my notes do not mention any defect. At the second examination anæsthesia and analgesia had so far increased that it was absolute over the *whole left* side, with the exception of the face and palmar surface of the hand, where the defect was not absolute. The thermal sense was impaired over the same region. Over the scrotum and penis sensation was normal. In the median line of the body the anæsthetic was separated from the sound half by an intermediate zone about three-fourths inch wide, over which sensation was impaired only.

Paresis. The strength of both arm and leg (left) is described as "weak" at both examinations, but not so much so but that considerable use of these limbs was retained. There was no paralysis of the face or tongue, nor was there any *rigidity* or *atrophy* of muscles.

[1] Boston Medical and Surgical Journal, January 7, 1892.

Reflexes. At the first examination the right knee-jerk was feeble; the left was normal ("not exaggerated"). At the second, the reverse obtained—*i. e.*, the left was slightly diminished compared with right; both were within normal limits. The *cremasteric* was present on both sides (1891), the plantar absent on both, and neither foot was ticklish (1891). (This was ascribed to his having had both his feet frozen during the war, since which accident the soles of each had felt numb.)

Vision and hearing. He was slightly deaf, and vision was impaired on both occasions. The defect of sight was accounted for by the presence of cataract in both eyes.

The following was noted at the second examination, which was the more thorough of the two: Field of vision, *tested by the finger*, not noticeably limited. Hearing, tested by watch, showed R. c/18, L. o/18; by voice, nearly absolute deafness in left, decided deafness in right. Right drum moderately retracted; left drum was seen to be decidedly opaque and retracted. *Taste* and *smell* were diminished or abolished on left side.

The patient stated in most positive terms that his sight, sensation, and strength (left side) varied from day to day. Some days he had fair use of the arm; on others, he could "not raise the left arm at all."

The origin of his disability dated from 1862, when in battle he was struck on the left side by a piece of shell, or some large missile. The force of the blow was broken by his blanket—rolled up and slung around him, and the skin was not injured beyond a black-and-blue spot, which the nurse told him could be seen below the left shoulder-blade. He was knocked unconscious, and sent to the hospital. His left side was "paralyzed immediately after the accident, and has remained so ever since," though it is better now (1886) than it was.

CASE II. *Functional paralysis of the left arm, following gunshot injury; duration, twenty-eight years; death from cancer.*—The examination, of which the following are the notes, was made December 1, 1886: "There is complete *paralysis* of all the muscles of the arm and hand from the shoulder down, including the deltoid. There is slight *loss of sensation* over the whole arm. There is *no atrophy* (degeneration), although the muscles are softer to the touch than those of the right arm." There was *no rigidity* or contracture of the muscles. My notes do not mention the condition of the reflexes, although I am certain they were carefully examined, and not found to be increased. The case was a typical one of *flaccid paralysis.* Although the arm was possibly smaller than the right, as would naturally result from disuse, it did not present that atrophic appearance so characteristic of paralysis from injury of the peripheral nerves, and which is so easily recognized.

The condition of the arm followed immediately upon a gunshot wound inflicted at the battle of Gettysburg, July, 1863. The ball entered the left arm between the upper end of the belly of the biceps and the tendon of the deltoid, and passed through the bone upward and backward. From this it will be seen that the wound was not so situated as to account for the paralysis and loss of sensation. Aside from the paralysis of the muscles below the wound, it could not possibly account for the paralysis of the deltoid.

It should be said that the condition of the face and legs was normal.

A functional paralysis would seem to be the only rational explanation of the case. The subject suffered from time to time from fainting or dizzy spells. On two occasions he was found lying on the ground uncon-

scious. The unconsciousness lasted about two hours. No one seems to have ever observed anything of the nature of convulsions at these times, and the attacks are said to have puzzled his physicians. The paralytic condition of the arm persisted up to the time of his death (September, 1891), which took place from "cancer in the side." There was a tendency to improvement, as the arm was rather better during the last years of his life. He had regained a certain amount of use of it, but I am unable to say exactly how much.

Case III. *Functional paralysis of the arm, following injury to the side.*— This case was first seen by me December 1, 1886. At that time there existed decided but not absolute paralysis of all muscles of the hand and arm, including the deltoid. There was also profound but not absolute anæsthesia over the same arm, extending above to a point half-way between the shoulder and the root of the neck, and behind over the scapular region. The anæsthetic area was separated from the normal skin by an intermediate zone about two inches in width, where the anæsthesia existed in a less degree. There was no degenerative atrophy of the muscles nor contractures or rigidity; the deep reflexes were not exaggerated. The monoplegia in this case dates from the battle of Newberne, March 14, 1862, when he was injured in the following way. I give the account in the patient's own words:

"In the course of the fight one of my men was wounded; being near him, I was about to give him a drink of water, and held out with my left hand a tin dipper, when a round shot struck the dipper, knocked it from my hand, passing up the length of my forearm, and, fortunately for me, had just room enough to pass between my elbow and side. The wind of the shot turned me half-way round, and threw me with great force to the ground. I was unconscious for twenty-four hours, and very much confused for a week after." On recovering consciousness the "numbness and loss of feeling in the arm were the same as at present." The arm and side were bruised, but nothing more. He thinks that when he fell, he struck on "the back of his head" and "middle of the back, either dislocating or otherwise injuring three ribs." Under date of December 2, 1891, he writes: "The spot on the back of the head is as tender and sore to touch to-day as ever;" and he still complains of great "pain and soreness directly through the ribs just below the breast-bone. If he makes a misstep, or coughs, or tries to lift anything, it gives him severe pain and remains the same as ever."

At an examination in 1886 no signs of any injury to the side or head was found; no cicatrices of wounds or anything that would account for the pain complained of. No note of the special senses was made at that time; but December 1, 1890, he writes: "My left eye-sight is as if I were in a fog; the left ear almost totally deaf." December 1, 1891, his disability still persisted unchanged. The monoplegia has therefore existed nearly thirty years.

That the picture presented by these cases resembles that of functional disease there can be no doubt; nor can it be doubted that this diagnosis would be made in cases presenting similar symptoms immediately after an injury. I do not see any reason to question the diagnosis because of the long persistency of the symptoms, and to assume that for this reason there must be an organic lesion present.

REVIEWS.

A System of Practical Therapeutics. Edited by Hobart Amory Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia; assisted by Walter Chrystie, M.D., late Physician to St. Clement's Hospital, and Instructor in Physical Diagnosis in the University of Pennsylvania. Vol. II. Pp. 1124. Philadelphia: Lea Brothers & Co., 1892.

The second volume begins with a paper by Dr. Robert W. Taylor on "The Treatment of Syphilis," thus bringing to a close the subject of Diathetic Diseases and Diseases of Nutrition. The author is not a believer in the possibility of aborting syphilis by excision of the primary lesion, nor indeed in the early treatment by mercurials to avoid secondary infection. But when the diagnosis is absolute, he uses the approved remedies with vigor and intelligence. He discusses in full the expectant, tonic, and interrupted methods, and finally presents in a manner that shows upon every page the hand of the master the general methodical treatment, relying almost entirely upon mercurials and iodides. He frequently gives valuable formulæ for administration of mercury by the way of the mouth and stomach, inunction, fumigation, and hypodermatic injection, while his remarks upon thermal baths are judicious. The local treatment is carefully elaborated, while that of hereditary syphilis is fully explained. The paper is complete and modern, showing an extensive acquaintance with the literature, and, indeed, is in itself a monograph. Relying upon a small number of remedies, no one, after a careful study of this paper, could fail to use them to better advantage.

The treatment of Fevers occupies two hundred and thirty pages. Dr. J. Lewis Smith gives a fair statement of the resources at our command in "Scarlet Fever, Measles, Rötheln, and Varicella." "Smallpox" is the subject of a paper which is complete in the discussion of prophylaxis and treatment, dividing the course of the disease into stages, in which one finds recorded the large experience of the author, Dr. William M. Welch. A notable article, and one that should be read by every faithful practitioner, is the work of Dr. Frederick P. Henry on "Typhoid Fever." His prophylaxis is complete, his treatment excellent, exhaustive, careful, and one that will commend itself to all, save to those who appreciate but one symptom of this variable disease. He appends a good bibliography. Dr. Manuel Dominguez writes briefly upon "Typhus Fever," giving considerable attention to symptoms and devoting but a brief space to treatment. "Malarial Diseases and Dengue," by Dr. George Dock, naturally includes a consideration of the use of quinine. The paper is moderate in tone and satisfactory. In presenting the subject of "Yellow Fever," Dr. Jerome Cochran has collected the opinions of several physicians of Havana, which differ somewhat in detail of

treatment, depending upon their variations of theory. His own contribution is a very complete and intelligent statement of what we may hope to accomplish in this disease. Dr. J. C. Wilson has a much too brief space allotted to him in which to write of the "Therapeutics of Cerebro-spinal Fever," yet he has given us a good contribution.

The Diseases of the Respiratory System occupy two hundred and eighty pages. Dr. Ralph W. Seiss writes of "The Treatment of Diseases of the Nasal Chambers," in short chapters, but containing many practical suggestions. The "Diseases of the Pharynx and Larynx" were intrusted to Dr. Charles Sajous; the subject is presented in a very complete and through manner. Dr. J. Chalmers Cameron writes fully of "Diphtheria and True Croup," giving a valuable and resourceful paper, and, indeed, with a full appreciation of the merits of intubation as compared with tracheotomy. "Asthma, Acute and Chronic Bronchitis, and Whooping-cough," is the title of the paper of Dr. James T. Whittaker. We would object strongly to any attempt to construct a system of therapeutics for asthma, had not our author very wisely recognized that a classification was necessary. The subject of the treatment of bronchitis is not entirely satisfactory, in that there has been much work done in recent years which should have a place in this work. In whooping-cough we have a multitude of remedies mentioned, although but little that can aid us in selection. "The Therapeutics of Pulmonary Emphysema, Atelectasis, Abscess, and Gangrene," is well portrayed by Dr. M. Howard Fussell. The paper is eminently satisfactory and helpful. Dr. Edwin E. Graham goes over the subject of "Croupous and Catarrhal Pneumonia," and gives a complete and fair account of modern methods. "The Treatment of Diseases of the Pleura," by Dr. Rudolph Matas, is encyclopædic and thorough, particularly rich in therapeutic hints.

One hundred and sixty pages are devoted to a consideration of the treatment of Diseases of the Circulatory and Hæmatopoietic Systems. The first paper—on "Acute and Chronic Diseases of the Heart," by the veteran, Dr. W. H. Thomson—shows his care in observation and wealth of experience; a careful study of a few remedies, and these used to good results, although the tendency is toward combination, yet he clearly sees in each remedy its own sphere of action. Dr. T. Lauder Brunton has given a clear, readable, and very philosophical article on the "Nervous Diseases of the Heart, including Angina Pectoris." Two papers by Dr. Frederick C. Shattuck—one on "Diseases of the Bloodvessels," the other on those of the "Blood"—claim attention for the care shown in their preparation, the completeness of the treatment, and the judicial fairness in the discussion. "The Treatment of Diseases of the Liver, Gall-bladder, Hepatic Ducts, and Spleen," fully given by Dr. J. H. Musser, is eminently satisfactory, the therapeutics of the liver being particularly to be commended for the painstaking research shown in the writing. Dr. Richard C. Norris has neglected nothing in his article upon the "Diseases of the Thymus and Thyroid Glands, and Exophthalmic Goitre." It is clear, up to date, and, indeed, concise.

The final section—two hundred and seventy pages—treats of Diseases of the Digestive System, and here we find great satisfaction. Dr. A. D. Blackader, on the "Diseases of the Mouth and Salivary Glands, including Mumps," has given us a valuable paper, omitting nothing of importance. The various forms of glossitis, generally discussed in text-books in a perfunctory manner, here receive due attention. A paper

that calls for very earnest study—because one finds here a most complete, recent, and praiseworthy compilation of the methods in vogue in our best clinics for the treatment of "Acute and Chronic Gastric Catarrh, Gastric Atrophy, Gastric Ulcer, Gastric Cancer, and Gastric Dilatation" —is by Dr. D. D. Stewart. He has supplied a long-felt want in presenting this paper, which embodies the work of the best French, German, and American clinicians. His numerous foot-notes, in many cases containing information well worthy of a place in the text, will amply repay study. This subject is exhaustively treated, condensed so far as is possible without sacrificing clearness, and represents the present knowledge of the representative practitioner. Dr. Frederick A. Packard goes over "The Treatment of Cholera Morbus, Cholera, Cholera Infantum, and Dysentery." The treatment is in the main judicious, yet it seems that we might justly expect to find intestinal antisepsis fully discussed. "Obstruction of the Intestines," by Dr. Edward Martin, is a fair paper upon a subject somewhat difficult to write about dogmatically, since each individual case demands especial study. "Peritonitis, Appendicitis, and Perityphilitic Abscess," by Dr. Roswell Park, although intrusted to a professed surgeon, has not been found wanting in medical therapeutics. He has presented the recent and fair views on this subject, and this paper will command attention. The last article—by Dr. Charles B. Kelsey, on "The Treatment of the Diseases of the Rectum and Anus" —is a clearly written and practical contribution based upon a large personal experience. The mystery of this region, which to some practitioners appears to be great, will surely be lessened after a careful reading of this work.

A good index, which this volume contains, will lighten the labors of those who make this volume what it deserves to be—a companion of their daily work.

Taken as a whole, this volume is more valuable than its predecessor, in that there is not such a marked difference in the value of the articles. Yet there are many pages devoted to symptomatology and theoretical discussions which do not seem to be necessary for a clear exposition of the indications for treatment. It will take its place with the other Systems that have been published, and it will not suffer from the comparison. It fairly represents the present status of therapeutics, and shows the intense practicality and thorough good sense of the American physician.

R. W. W.

THE PRACTITIONER'S HANDBOOK OF DISEASES OF THE EAR AND AFFECTIONS OF THE NOSE AND NASO-PHARYNX RELATING TO AURAL THERAPEUTICS. By H. MACNAUGHTON JONES, M.D., M.Ch., M.A., and W. R. H. STEWART, F.R.C.S. Ed., etc. Fourth edition. 12mo. Pp. 392. With 152 illustrations and two lithographic plates. London: Baillière, Tindall & Cox, 1892.

IN the fourteen years that have elapsed since the appearance of the first edition of this work, much has appeared in otological literature to claim notice or attention in a text-book, and this excellent manual of Jones and Stewart has grown threefold and taken cognizance of all the

more important matters. Designed to be eminently practical, little space is given to anatomy and physiology, and these and other topics are dealt with so curtly as sometimes to demand outside study to render fully comprehensible what is given. The etiological views seem based largely upon some 4000 cases of the authors, with little reference to the wide statistical studies of Buerkner and others; but the review of the various forms and causes of ear disease is careful and good, according well with the best authorities. The lines laid down for the study and record of cases, the history-taking, the testing of hearing, the investigation of the naso-pharynx and of the ears themselves, are concise, practical, and generally unexceptionable. Ogston's observations and diagrams as to the limits of the fields of hearing are given at some length, without criticism; although it is elsewhere noted that the watch can be heard by the ear which is turned away from it. As with many text-books, "introducing a speculum" is used too often as equivalent to making an ocular examination of the auditory canal and drum membrane—a procedure in which the speculum is often unnecessary and at times undesirable. In investigations of the hearing by the tuning-fork, Rinne's test might be better described (especially in Roosa's simplified form, "is it louder back or in front of the ear"); and Gellé's test deserves fuller notice as a means of deciding whether the stapes is ankylosed or not.

Two chapters are devoted to nasal matters in their relation to aural affections, and include the excellent rules: "But in operative procedures, we submit, we are bound to go cautiously. In those aural cases which come under our observation that demand operative interference in the naso-pharynx, we are influenced by (1) the presence of hypertrophied tonsils—all such, we believe, should be reduced or removed in cases of tinnitus and deafness; (2) the presence of adenoid growths—these should be removed; (3) hypertrophied portions of turbinated bones and morbid growths, polypi—these should be excised or reduced; (4) displacements and ecchondromatous enlargements, with consequent deviation of the septum—require interference to free the obstructed nasal passage."

Good directions are given as to the employment of the Eustachian catheter and the various uses of the syringe are well described, except that sight is not constantly employed as a guide. Syringing per catheter is rather a favorite measure, and Hinton's views as to mucus in the tympanum are accepted to the utmost limit of the authors' only partially confirmatory experience. The surgeon is held to be the proper person to do almost every part of the treatment, leaving little to the patient or friends: "Of late years the conviction has grown on us that the fewer the washes we use in aural practice the better." Less commendable are the views as to poulticing and warm fomentations in furuncle of the meatus, and the employment of insoluble powders, iodoform by preference, in suppuration of the tympanum.

The importance of mastoid suppuration is well dealt with, and early incision and bold but careful opening of the bone are advised in its treatment, drainage being the object of the operative intervention rather than the eradication of all morbid tissues. The drill or one-quarter-inch trephine is preferred, therefore, and the perforation made close behind the meatus and parallel with it, in accord with the study of Birmingham, quoted at some length. Other operative measures such

as tenotomy, excision or mobilization of ossicles receive short and cautious notice.

"Perchance as a personal sufferer in the past from two distinct forms of tinnitus" is the explanation Jones gives for his "abbreviated" account of tinnitus, which occupies six of the twenty-four chapters of the work. The study is very complete and as satisfactory in its teachings of the causes and treatment of this most troublesome symptom as the difficulties of the subject permit. Electricity is warmly commended on the ground of actual success achieved, and some who have been discouraged by the non-success of themselves and others may find here reason for further trial.

The final chapter is given to a *résumé* of formulæ and other therapeutic suggestions, which is good, though rather vaguely comprehensive. We miss any reference to the valuable cleansing properties of hydrogen dioxide, would advise extreme caution in the use of cocaine (4–10 per cent.) as a nasal spray, or the mopping with 20 per cent. solution elsewhere mentioned, and would note that it is much more convenient to fuse chromic acid or silver nitrate by dipping the hot probe into the crystals and then holding again near the heat. Swabbing with saturated chromic acid solution, as mentioned on page 187, seems dangerous even in skilled hands, and not to be recommended in a text-book.

There are some verbal errors, such as "mucous lining of the meatus," "trocular herophyte," and some ungraceful or obscure sentences; but the language is often terse and excellent, as in the statement: "Quietness and firmness with friends, patience in using the syringe, extreme caution with all forms of mechanical helps, are the essentials for successfully dealing with foreign bodies in the ear." The illustrations are numerous and excellent, and the book, as a whole, a very good realization of the effort of its authors to furnish a practical manual of treatment.

B. A. R.

LEÇONS CLINIQUES SUR LES MALADIES MENTALES. LE DÉLIRE CHRONIQUE À ÉVOLUTION SYSTEMATIQUE. Par V. MAGNAN. Recueillies par MM. LES DRS. JOURNIAC et SÉRIEUX. Paris, 1891.

CLINICAL LECTURES ON MENTAL DISEASES. CHRONIC INSANITY OF SYSTEMATIC DEVELOPMENT.

IT has long been evident that any attempt to classify the insanities is premature; that all existing systems of classification are but tentative; and that the reason for this is that the anatomical and even the clinical knowledge of insanity is yet far from accurate and profound. If we turn to the text-books that contain the most ambitious and dogmatic systems, such especially as have been inspired by the German school, we are impressed with their inconsistencies and their failure to group and harmonize the increasing number of accurate pathological findings. The author of the most original modern work on insanity, Bevan Lewis, has contended himself apparently with no classification whatever, but has demonstrated a wealth of brain-pathology quite unheard

of in the older text-books, which will perplex the systematists for many a day to conform to it their schemes of classification.

M. Magnan's book introduces us to a subject than which none has been more prolific of endless debate about its place in nosology—the systematized delusion. It is pleasant, however, to find but little of this debate in M. Magnan's book. It is one of its special merits that it is not controversial, but strictly scientific in spirit and matter, and that it presents an array of carefully observed facts, which go far to establish the disease of which it treats as a distinct entity. The author gives a short *résumé* of the recent famous discussion before the Medico-psychological Society of Paris, in which the "délire chronique" withstood the desperate assaults of the partisans of monomania, and passes on to a brief historical sketch of the opinions of Lasègue, Morel, and Foville, who, after Esquirol, have moulded professional opinion in France and elsewhere on monomania. He then devotes his book to a careful clinical description, based upon many cases, of the "délire chronique à évolution systematique," or, as we may translate it, "chronic systematized insanity," a form of insanity by no means new, but which many will recognize, perhaps for the first time, when freed now by Magnan from its forced and unnatural association with monomania, paranoia, or the hereditary degenerated groups.

M. Magnan's position is briefly this: There exists a psychosis which has four successive periods. 1. Incubation. 2. Period of delusions of persecution with hallucinations of sight, hearing, etc. 3. Period of delusions of grandeur. 4. Dementia. This psychosis ought to be clearly separated from the systematized insanity of the hereditary and degenerated class. It has a physiognomy so personal, a march so regular, a prognostic so constant, that it ought not to be confounded with all the insane who merely have persecutory delusions. For Magnan this is a species clearly defined, and distinguished from all other forms of insanity as well by its beginning as by its regular course. Because of its regular progress it has been called by Garnier "progressive systematized insanity." Finally, it is observed only in subjects who are *not* hereditarily insane, and whose minds are normal up to the beginning of the disease.

The author insists constantly upon this regular progressive character of the disease, and upon its occurrence in persons entirely free from the stigmata and physical deformities of the hereditary insane. The disease makes its debut with a more or less prolonged prodromal period. This is characterized by illusions, false interpretations, and inquietude. In the second period, the chief symptoms are hallucinations, especially auditory, affections of general sensibility, and delusions of persecution. The third period presents one of the most characteristic features of the disease, the transformation of the persecutory into the ambitious delusion. The fourth, and last, period is marked by the decay of the mind, permanent dementia. These periods succeed each other invariably in the same order. The modes of reaction of the patient to his delusion in the second period also follow, according to Magnan, a set rule. First, he flees, and avoids the imaginary dangers. Second, he defends himself. Third, he assaults his enemies and persecutors. He thus becomes the frequent object of medico-legal inquiries. The transformation of the delusion of persecution into the delusion of grandeur is one of the most interesting phenomena in mental pathology. It is

sufficient to say that the delusion of grandeur is a symptom of evil augury, and is too apt to show itself just when the mental organism begins to disintegrate, as in this disease and in general paresis. Dementia always closes the scene. The prognosis of chronic systematized insanity is hopeless, but it does not impose the brand of a necessary mental taint upon kindred and posterity.

In conclusion, we are impressed with the truthfulness of Magnan's clinical picture, for it corresponds with much that we have seen. It presents not so much a new type for classification, as a living disease, seen through all the confusion of theory and controversy, and properly described. J. H. L.

THE PRINCIPLES OF BACTERIOLOGY: A MANUAL FOR STUDENTS AND PHYSICIANS. By A. C. ABBOTT, M.D., First Assistant, Laboratory of Hygiene, University of Pennsylvania, Philadelphia. With Illustrations. 8vo., pp. viii, 263. Philadelphia: Lea Brothers & Co., 1892.

THE increasing importance of a knowledge of the rudiments of bacteriology to every medical student of the day has created a demand for a text-book that would embody the results of the latest investigations, and that would furnish a summary of the best methods of technique in present use. Various small volumes designed to fill such a want have made their appearance during the past year, but no very satisfactory one in English until the publication of the one under consideration. As stated in the preface, the author has kept in mind the needs of the student and practitioner of medicine, and has endeavored to satisfy these needs by as direct a statement of the principles of the work as might be. In this effort he has attained a great degree of success, and the book will serve as an exceedingly valuable assistant upon the laboratory table for anyone engaged in this sort of work.

Ideas of technique are here presented in a concise form for the first time in English that are of great value, and that have heretofore been inaccessible to the majority of beginners; for this reason alone the book is one that can hardly be spared. It furnishes the most satisfactory manual upon the subject of which it treats yet published in English.

[NOTE.—An apology is due the author for the delay in the preparation of this notice—but it has been caused by the illness of the reviewer.]

H. C. E.

HANDBOOK OF DISEASES OF THE EYE AND THEIR TREATMENT. By HENRY R. SWANZY, M.B., F.R.C.S.I., Surgeon to the National Eye and Ear Infirmary; Ophthalmic Surgeon to the Adelaide Hospital, Dublin; Examiner in Ophthalmic Surgery in the Royal University of Ireland. Third edition. London: H. K. Lewis, 1890.

THIS handbook in its slightly enlarged third edition preserves the valuable features of former editions, and presents several changes that add materially to the interest and value of the work. One of these changes

is the introduction of a number of additional original illustrations, another is the recasting of the portion treating of the diseases of the uveal tract and including them with sympathetic inflammation in a single chapter.

But probably the most valuable additions are to be found in the chapter on "Amblyopia and Amaurosis due to Central and other Causes," where we find the practical essence of the author's monograph on the *Value of Eye Symptoms in the Localization of Cerebral Disease.* It is very pleasant to find the most recent results of investigation in this field, of great present scientific activity, so well presented, without giving up space to unnecessary detail and matters of only temporary interest.

In regard to matters still *sub judice* with ophthalmic surgeons we note that Swanzy continues to favor iridectomy in cataract extraction; and is evidently skeptical as to the causation of nervous disease by "insufficiencies" of the ocular muscles. E. J.

THE POCKET PHARMACY, WITH THERAPEUTIC INDEX. By JOHN AULDE, M.D. Pp. vi., 185. New York: D. Appleton & Co., 1892.

A GUIDE TO THERAPEUTICS. By ROBERT FARQUHARSON, M.P., M.D. EDIN., F.R.C.P. LOND., LL.D. ABER. Pp. xii., 406. Fifth edition. London: Smith, Elder & Co., 1891.

COCA AND COCAINE. By WILLIAM MARTINDALE, F.C.S. Pp. viii., 76. Second edition. London: H. K. Lewis, 1892.

THE title of Dr. Aulde's book is misleading, in that we might expect to find a small work treating of the science of drugs and the art of selecting, preparing, and combining them. It is only in the sub-title, "a *résumé* of the clinical applications of remedies adapted to the pocket-case, for the treatment of emergencies and acute diseases," that we find declared the true scope of his work. It is, in fact, a therapeutic index to the use of acetanilide, aconite, atropine, bryonia, camphor, cannabis, gelsemium, ipecac, morphine, quinine, rhus, strophanthus, strychnine, trinitrin, and certain salts of arsenic, calcium, copper, iron, mercury, and zinc, and when used in form of pill, tablet, or granule. It omits certain remedies, which might properly be included, useful for emergencies, for example, apomorphia, while in recommending scientific medication such combinations as the acetanilide, alterative, calcium sulphide, copper arseniate, morphine hydrochlorate compounds are inadvisable in a pocket-case when extemporaneous combinations could better be made. Again, there is lack of uniformity of dosage, calcium sulphide being given in one-tenth of a grain and strophanthus (tincture) in two-minim doses, the latter being evidently too large for as frequent repetitions. The book, although a very useful one, yet must be used by one with considerable experience, because of necessity the generalizations are brief. One should not practice by it for a special disease but after a thorough study of its contents. It is readable, well brought down to the present times, and, taken as a whole, optimistic.

Dr. Farquharson has done more than written a guide, as he modestly terms it; he has given to the profession a treatise on the subject, and so

well has he done his work that it is now in the fifth edition. The section devoted to diet is judicious, while a brief report on the uses of the mineral waters is good. He has remodelled the portion treating of narcotics and purgatives, and the subject of antiseptics, so far as it applies to surgery, is excellent. He has classified the remedies so that the subjects are easily studied. Each drug is discussed from the standpoint of its physiological and its therapeutical action in parallel columns, and this is done concisely and clearly. The therapeutic column is full of practical points, and the addition of frequent formulæ is an excellent feature. Taken as a whole it is interesting to read and withal a safe text-book.

Mr. Martindale has rendered a good service to the profession in collating the literature of coca and its alkaloid—cocaine. In thirteen chapters he gives the early history of the drug, the superstitions, its literature, not omitting, even, an extract from the poetry of Abraham Cowley, the account of modern travellers, its cultivation (observations by Dr. Rusby), Dr. Mantegazza's experiments, the botanical description, the report of U. S. Minister Gibbs, its use as a restorative, the pharmaceutical preparations, and its medical uses. In two chapters cocaine and its salts, with a list of the conditions in which they may be employed, receive due attention, and this very complete little book ends with an excellent list of references to current medical literature. R. W. W.

THE ETIOLOGY, PATHOLOGY, AND TREATMENT OF DISEASES OF THE HIP-JOINT. Fiske Prize Fund Dissertation No. 42. By ROBERT W. LOVETT, M.D., Out-Patient Surgeon to the Boston City Hospital; Assistant Surgeon to Out-Patients at the Children's Hospital, Boston; Member of the American Orthopedic Association. 8vo., pp. 220, with 56 Illustrations. Boston: George H. Ellis, 1891.

THE author of the monograph in hand has seen fit to confine himself to the exact minimum requirements of the subject set by the Trustees of the Fiske Prize Fund for the prize of 1891. By so doing, or perhaps being compelled to do, he has given to the work its only serious defect, namely, incompleteness; for it must be admitted that a book intended for general reference and study is unfortunately deficient when deprived of any reference to symptomatology and diagnosis. However, it is a pleasure to turn our attention from what the book does *not* contain to that which it does furnish when the matter is so excellent as is here presented, for therein are compiled, epitomized, and arranged in a pleasing, scholarly manner, by the hand of an erudite specialist, all important facts and theories relating to the etiology, pathology, and treatment of diseases of the hip-joint, leavened throughout by the author's own wide clinical experience and experimental deductions.

In Chapter I. a tentative working classification of the diseases of the hip is given with the reservation that "in the present state of pathology it is impossible to present any classification of diseases of the hip-joint which shall be sanctioned by authority weighty enough to give it pre-

eminence," for "it is essentially a time of transition in the history of the pathology of bone and joint disease."

The second chapter is devoted to the acute arthritis of the hip in infants, which "is to be considered as an acute joint destruction, in most cases pyæmic, but also to be attributed to other causes," originating usually as an acute infectious osteomyelitis of the upper epiphysis of the femur. Then follow two chapters upon acute and chronic synovitis, in which the writer sufficiently emphasizes the dangers involved in giving a diagnosis of simple synovitis, rather than in every case presuming the presence of and treating for tuberculosis, until, by its course, the case is proved to be one of the simpler inflammation.

Chapters V. and VI. are devoted to "Tuberculous Ostitis of the Hip," in which ordinary "hip disease" is described, and its specific origin enunciated. Here is centered the chief portion and interest of the work; the discussion of pathology and treatment is judicious, properly conservative, and practical, while the text is illuminated and ornamented by a splendid series of photo-engravings which admirably convey the writer's meaning as well as clinical pictures of the various forms and features of the malady. Regarding the etiology of hip disease the author advocates the opinion that "it occurs, as a rule, only in those who have an hereditary or acquired tendency to tuberculosis, and that in a large porportion of these cases an accident is the exciting cause. He inclines to the belief that in the treatment of tuberculosis here situated," traction produces very decided modification of intra-articular pressure, and in some instances undoubtedly results in distraction of the joint surfaces." Hence treatment for very prolonged periods by appliances which produce traction as well as fixation is strongly advised. We note with pleasure the simplicity, practicability, and limited varieties of apparatus commended and pictured in these chapters —a very unusual, but none the less acceptable, departure in orthopedic literature.

In the section devoted to operative treatment all the various theories and methods are balanced and a sound choice invariably made; but the actual descriptions of some of these procedures—notably, excision of the hip-joint—are too brief and incomplete for the average reader. Early free incision, scraping and irrigation of the sac, and immediate suture without drainage are urged in the treatment of hip abscesses, and supported by successful clinical experience, but where there is "much inflammatory exudation into the tissues, in cases which are particularly acute, and in very extensive abscess cavities," open incision and packing are advised as preferable. Aspiration is condemned, and iodoform injections are ignored. We regret to find flaxseed poultices recommended as applications to fresh incisions into suppurating tissues.

"Gummatous Arthritis," "Arthritis Deformans," "Charcot's Disease," "Tumors," Loose Bodies," and "Hysterical Affections," are each accorded chapters, but require no special comment.

Finally, "Congenital Dislocation of the Hip" receives notice in one of the best *résumés* of this subject that has yet appeared. Mechanical measures of relief are most favored, and all operations are declared probably useless save that of Hoffa alone, which is yet on trial, but gives much promise.

A feature of this monograph is the almost encyclopædic lists of references which close each chapter, and attest the diligence of the research

which has preceded its writing: these alone will make the book invaluable for reference.

The typographical and artistic features of the work leave nothing to be desired, but the absence of an index is a very aggravating omission in this otherwise excellently made up volume. T. S. K. M.

A DICTIONARY OF TREATMENT, OR THERAPEUTIC INDEX, INCLUDING MEDICAL AND SURGICAL THERAPEUTICS. BY WILLIAM WHITLA, M.D. Revised and Adapted to the Pharmacopœia of the United States. Philadelphia: Lea Brothers & Co., 1892.

THIS is an octavo volume of nearly 1000 pages, intended for a ready reference book, and as such will be found useful. The maladies are alphabetically arranged; under each head the author states as briefly as possible the indications to be met, and the best means of meeting them. In diseases when special difficulties or dangers may be confronted he gives a concise statement of the pathological conditions, and the way each should be treated, often adding valuable notes in pharmacology. In some instances his directions for management are quite minute. For example, in the nine pages devoted to constipation the conditions on which this physiological vice depend, and its various forms and degrees, are set forth in a few words, together with the manner of combating each most successfully.

The management of heart affections occupies twenty pages, and includes, besides a brief mention of the recognized reliable methods of correcting this disturbance, a short and practical discussion of the conditions in various stages of organic diseases and their effects, giving the reasons for cure in diet, exercise, and the selection of medicines.

Under hydrophobia and tuberculosis especial attention is given to the recent much discussed therapeutic methods. The rules laid down by Pasteur for the treatment of the former are given in detail, besides other methods that have seemed to be of value.

As to the latter the author shares the regret of the civilized world that tuberculin has not proved to be what was at first expected, but referring to the recent contributions upon the subject he shows that a better understanding of its nature is being arrived at.

In the twenty-four pages given to pulmonary phthisis the very many methods of management are either fully described or briefly mentioned, and their usefulness commented upon. Climatic treatment is viewed solely from a European standpoint, and the advantageous localities of the Eastern hemisphere are given. The rules governing the selection of a climate for each class of cases are, however, universally applicable.

Very little is said in the work concerning the treatment of that very large and rather indefinite class of troubles arising from intestinal indigestion and from inadequate performance of the hepatic functions. These, for the most part minor maladies, cause much distress, and often tax the resources and ingenuity of the practitioner.

There are many points in the book that would seem to bear some revision; but it is, nevertheless, the most complete and satisfactory small work of its kind published. F. S. J.

STRICTURE OF THE RECTUM: A STUDY OF ONE HUNDRED AND THIRTY-EIGHT CASES. By CHARLES B. KELSEY, M.D., Professor of Diseases of the Rectum at the New York Post-Graduate School and Hospital; late Professor of Rectal Surgery at the University of Vermont, etc. 8vo., pp. 48, with 12 illustrations. Second edition, enlarged. 1892.

THE second edition of this valuable monograph appears greatly enriched by the addition of descriptions and comments of all the recent additions to major rectal surgery; otherwise the changes are but those incident to the greater experience and riper judgment of one of the foremost workers in this special field.

The writer's cases of stricture of the rectum—tabulated to the end of 1891—now number 138, and certainly afford ample material upon which to base authoritative conclusions, but, as the work is already familiar as a whole to the profession, we will but notice a few of these conclusions relating to operative procedures.

For dilatation the soft rubber bougie is commended, of which a size should be employed "which will pass through the stricture without force, and which may be left in place for several hours without causing uneasiness," and by which absorption, not stretching, of the pathological product is desired.

Linear proctotomy is not highly favored except in unusual cases, as dilatation has to be maintained subsequently whether the incision is employed or not. But if incision is determined upon it should invariably be carried down to and through the sphincters to provide for drainage; otherwise these become "the most dangerous incisions in the surgery of the rectum," because of the risks incurred from hemorrhage and sepsis.

It is stated that cauterization and electrolysis can accomplish nothing that cannot better be done by linear proctotomy; that in malignant diseases these procedures are contra-indicated; and further, that "electrolysis reduced to fact means, in the treatment of stricture of the rectum, either simple dilatation or the application of the cautery."

Regarding excision of the rectum the opinion is advanced that the disease should not be thus dealt with "unless there is reasonable certainty that it can all be removed, and that the lymphatics have not to any extent become involved"—colotomy is strongly urged as the alternative. Kraske's operation and its modifications are clearly described and commended, but the author, in his 138 cases has found none in which it appeared applicable, owing to the extent of disease.

It is urged that colotomy be performed at a much earlier stage than has been the rule heretofore, and the iliac, inguinal, or abdominal—whichever term may be preferred—in preference to the old lumbar method, is given unrivalled precedence in the writer's estimation. "It is not a dangerous operation when done under anything like favorable circumstances," and, "as to the benefits arising from the operation, too much can scarcely be said." His own objections to colotomy were formerly deeply rooted, but, in common with most modern surgeons, they have been entirely removed.

An interesting tabular record of the 138 cases upon which the brochure is based concludes the work. T. S. K. M.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D.,

PROFESSOR OF CLINICAL MEDICINE IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; ASSISTANT VISITING PHYSICIAN TO BELLEVUE HOSPITAL.

THIOPHEN.

An unsigned paper in the *Revue de Thérapeutique Générale et Thermale*, 1892, No. 5, p. 70, gives an excellent *résumé* of this subject. Thiophen is a hydrocarbon of the aromatic series, a colorless, limpid oil, of faint odor, and miscible with water in all proportions, having as its symbol C_4H_4S. Spiegler has used the thiosulphate of soda ($C_4H_3SNaSo_3$) and the iodide of thiophen ($C_4H_2I_2S$). The soda salt is a white powder, precipitated in the form of scales, contains 33 per cent. of sulphur, of a disagreeable odor which is usually not marked when in a 5 or 10 per cent. ointment. In prurigo complicated by eczema it can replace naphthol. The biniodide has been used as a substitute for iodoform. It crystallizes in beautiful plates, insoluble in water, but very soluble in ether, alcohol and chloroform. Its odor is characteristic, but not disagreeable; gauze impregnated in a proportion of 10 per cent. emits a slight odor, rather agreeable and aromatic. This salt, in the laboratory, will prevent the development of the *staphylococcus aureus*. In burns even to the third degree; so far as preventing odor and desiccation, it is superior to iodoform. Hock has used it in various conditions, phlegmon, contused wounds, lacerations, compound fractures, mastitis, onychia, and caries, with very satisfactory results. There seems to be no poisonous action; it does not give rise to eczema, it even seems to cure it, when existing. Applied as a powder it is a vigorous disinfectant, and may even give rise to a burning sensation which may persist for half an hour. It will deodorize more energetically than iodoform, but it is a less active stimulant of granulation-tissue.

SALIPYRINE.

DR. CH. ELOY gives a short review of this remedy, which was obtained by Spica, of Padua, by the mixture of 73 parts of salicylic acid with 100 parts of

antipyrine. It occurs in crystals, transparent, of sweetish taste, and decomposed by heat. Slightly soluble in cold water, it is very soluble in warm, and especially in alcohol. It possesses antipyretic and analgesic effects, and, like antipyrine, may give rise to exanthemata. In acute rheumatism it diminishes the pyrexia and pain, but is used in large doses, ninety grains or more daily, either in wafers or dissolved in glycerin or syrup of raspberry, and distilled water. After two days' treatment by large doses, a daily dosage of from fifteen to thirty grains is sufficient. In chronic articular rheumatism one commences with a daily dose of sixty grains, which is increased by fifteen grains, should the former prove insufficient. As the symptoms improve, the amount can be gradually diminished to seven grains, which must be continued for several weeks. In neuralgia and rheumatic hemicrania a daily amount of thirty grains, taken in two doses at an interval of three or four hours is beneficial; and as the pain becomes lessened, the remedy must be diminished and continued in the same manner as in the case of chronic articular rheumatism. It seems to be a very valuable remedy in rheumatism, and particularly in the very painful forms.—*Revue Générale de Chirurgie et de Thérapeutique*, 1892, No. 8, p. 123.

The Treatment of Chronic Gastric Affections by Washing Out the Stomach.

Mr. D. Harvey Attfield classsifies his cases as follows: (*a*) Muscular power in the stomach insufficient; (*b*) spasm of the pylorus; (*c*) abnormal dilatation of the stomach; (*d*) some cases of cancerous disease; (*e*) rare cases of sacculation; (*f*) obscure cases of obstinate vomiting. He summarizes his results as eminently satisfactory in that—(1) Vomiting is entirely checked; (2) the accompanying debility and nausea are avoided; (3) there is a marked decrease in pain; (4) there is an increase of appetite; (5) spontaneous action of the bowels frequently follows; (6) we can completely empty the stomach; (7) we can favor the recovery from dilatation. His cases show that there is a great therapeutic advantage by washing out the stomach with a siphon-tube. —*The Practitioner*, 1892, No. 284, p. 108.

Dr. W. Soltau Fenwick presents the other side of the picture. Among the dangers he cites: (1) Convulsions and tetany. Probably, because in a case predisposed to convulsive seizures by the chronic absorption of certain morbid products from the dilated stomach, the irritation of a gastric tube may constitute an efficient exciting cause. (2) Syncope and sudden death. Any sudden alteration in the gastric pressure can, in certain cases, bring about a reflex condition of shock. (3) Perforation. The using of a gastric catheter for the purpose of investigating the chemical contents of the stomach in cases of acute gastric ulcer, is a useless and mischievous procedure. (4) Hæmorrhage. Danger may arise from a too rapid evacuation of the contents of a dilated stomach. (5) Injury to the œsophagus or to the walls of the stomach. (6) Poisoning. From the use of antiseptics through the tube. Cases are cited illustrating each division. He concludes that the stomach is washed out for all sorts of symptoms, some of which are manifestly not to be benefited by this procedure. And in cases in which it fails to do good it is likely to be productive of harm in removing products of digestion whose manu-

facture has caused the stomach a considerable amount of labor. The indiscriminate use of this method in every case of disordered digestion will prove to be a curse rather than a benefit, and will eventually throw discredit upon the whole method of treatment.—*The Practitioner*, 1892, No. 286, p. 241.

On the Presence of a Digestive Ferment in the Anagallis Arvensis.

Professors G. Daccomo and P. L. Tommasoli found that this plant, made into a paste, would digest raw meat within four to thirty-six hours, at a little above the temperature of the body. To isolate the ferment they comminuted the plant in double its weight of distilled water, squeezed out the residue and washed it, obtaining the active principle in an aqueous solution, which was evaporated and treated with ten volumes of absolute alcohol. This was repeated three times, until a white precipitate was obtained. This product dried at an ordinary temperature with sulphuric ether, gave a white, amorphous, friable mass, having its peculiar odor. On calcination 11.22 per cent. of ash was obtained. The powder possesses a digestive property equally with the crude plant. It does not have any action upon starch, and apparently loses, after some time, its efficacy in digesting proteids. It is hoped that, with better methods of preparation, it may be made so that it will retain its properties.—*Rassegna de Scienze Mediche*, 1892, No. 4, p. 141.

[The classical work of Wurtz on the Carica papaya has stimulated others to search for vegetable digestive ferments. The Anagallis arvensis, scarlet pimpernel, is not an unknown remedy, although this is the first time it has been supposed to have any valuable properties. Orfila found that in three drachms of the extract was contained sufficient poison to kill a dog, with marks of inflammation of the bowels. It has been used for consumption, dropsy, epilepsy, mania, and, like most other remedies, as a preventive of hydrophobia. Heintzelman obtained a volatile oil from the dried herb, four drops of which caused intense headache and nausea, lasting for twenty-four hours, with pains throughout the body. Evidently, it is by no means an innocent plant.—R. W. W.]

The Treatment of Enteric Fever.

Dr. M. A. Boyd has modified his views upon this subject in the way of bringing his treatment more into harmony with the results of bacteriological investigation. Looking at the disease as primarily a catarrhal inflammation of the intestines, and, secondarily, as one of septic poisoning, his treatment resolves itself into suitable diet, and antiseptics. The diet should be bland and unirritating, such as will be absorbed mainly by the stomach and duodenum, and leave little to be dealt with by the lower part of the small intestine. He does not believe that he can abort a case of typhoid when once the characteristic fever has begun, but he can prevent, in the majority of cases, the septicæmic phenomena, which we have chiefly to deal with after the second week of the fever has passed. In choosing an antiseptic it should be one exercising its effects, not in the stomach, but in the intestinal canal, and should disinfect not only the contents of the bowels, but the intestinal walls

as well. The choice was made of chlorine in an alkaline solution, which mingles best with the contents of the intestine, and, knowing well how easily the intestines absorb gases and pass them into the blood, it is hoped that this gas will thus be more efficient. In more than one-fourth of his cases, when this treatment was begun early, the febrile process came to an end about the fourteenth to the sixteenth day.—*The Practitioner*, 1892, No. 284, p. 81.

Typhoid Fever Successfully Treated with Fel Bovis.

Dr. Adolph Zeh, after an extended use of the various antipyretics and intestinal antiseptics, reports favorably upon the use of this remedy in ten cases. He empties the alimentary canal by a sufficiently large dose of calomel, if the case is seen early; stimulates at once, preferably with whiskey; uses strychnine, caffeine, ammonia, camphor, and small doses of quinine; as a beverage, dilute nitro-muriatic acid in a large quantity of water, and fel bovis purificatum siccum in doses of two to four grains from three to six times daily in capsules. A liquid diet—milk, beef-tea, gruel, beef extracts or meat juices—is insisted upon.—*Merck's Bulletin*, 1892, No. 2, p. 83.

The Treatment of Infantile Diarrhœa of Warm Countries.

Dr. F. Roux divides the diarrhœas into four classes: 1. Simple catarrhal enteritis, frequently developed by cold, requires only rest, restricted diet, soothing applications to the abdomen, and graduated doses of paragoric. 2. Diarrhœa dependent upon digestive insufficiency, requires a small amount of magnesia in a half-glass of Vichy (St. Yorre) as a purgative, a milk diet, and soups devoid of fat. If the stools are offensive, a powder consisting of equal parts of the salicylates of bismuth and magnesia; naphthol being here contra-indicated because of the irritation which it produces. The return to the ordinary diet must be gradual, and before each meal he directs small doses of nux vomica, rhubarb, anise seed, and calumba, in a claret glass of Vichy or Vals. During the meals hydrochloric acid, and afterward pepsin, diastase, and pancreatin. He counteracts diarrhœa and vomiting by opium, the constipation by rhubarb. 3. The diarrhœa that follows dysentery calls for enemata of boric acid, nitrate of silver, or tincture of iodine, and the prescribing of a strict diet. 4. In true tropical diarrhœa the small intestine is the seat of disease, and it is necessary to insist upon intestinal antisepsis, salicylate of bismuth, sulpho-carbonated water, enemata of boric acid, or, better, of borated infusion of eucalyptus, with abdominal counter-irritation, as by tincture of iodine, or gentle frictions with flannel moistened with turpentine. The only method of satisfactory cure consists in an absolute milk diet, to which is added lime-water or Vichy salt. As soon as the stools are formed, beef-tea, peptones, slightly cooked white of egg and raw beef, eggs and milk, and, last of all, rice in milk can be tried. At all times remedies which assist digestion must be employed, while wine and every form of alcohol is absolutely prohibited. When the disease is cured, it is necessary for a long time to watch over the diet, and use remedies that build up the general condition. —*Revue Générale de Clinique et de Thérapeutique*, 1892, No. 9, p. 137.

The Physiological Action of Abdominal Massage.

Dr. Victor Eltz, having studied the contributions of Reibmayer and Nothnagel, believes that the action of massage in chronic intestinal catarrh depends upon the resorption of the infiltration of the wall of the intestine. In this view massage does not meet the indication of one symptom, but rather attacks the cause itself. The indications for the several methods for evacuation are: 1. For simple clearing of the bowels, *e. g.*, intestinal stenosis, internal purgatives. 2. For congenital hypoplasia of the muscular structures of the intestine, especially of the large intestine, irrigation. 3. In constipation, in general weakness, gymnastics, especially when lack of exercise is the cause. 4. Massage is indicated in—(*a*) true habitual constipation; (*b*) chronic intestinal catarrh (equally whether accompanied by diarrhœa or atony).—*Wiener klinische Wochenschrift*, 1892, No. 15, S. 221.

Creasote and its Elements.

Dr. E. Main has made a laboratory study of this remedy, which has of late attracted so much attention. He established the fact that the elements of creasote were poisonous in the following order: 1, para-cresylol (least); 2, phlorol; 3, guaiacol; 4, creasote; 5, creasol (most). Locally, creasol was the most irritant, guaiacol the least. For all these elements this laboratory work shows three important characteristics: 1, that they are feebly poisonous; 2, a tolerance can be established; 3, they are eliminated by the lungs. As remedies against tuberculosis they can be arranged in the following order: 1 and 2, phlorol and creasol; 3, para-cresylol; 4, guiacol; 5, creasote (most powerful). It is believed that although all the elements of creasote have some value, and indeed guaiacol should be especially mentioned, yet creasote is the most active. Beechwood creasote should be preferred for its antiseptic power, for its feeble toxicity, and because of the results furnished by experimental therapeutics as well as by clinical observation.—*Bulletin Gênêrale de Thêrapeutique*, 1892, liv. 10e, p. 205.

The Treatment of Pulmonary Tuberculosis by Inhalations of Sulphide of Carbon with Phosphate of Lime.

Dr. Coromilas has treated ninety-nine patients suffering from pulmonary tuberculosis, recording fifty-eight successes, of which twelve relapsed, and seven were cured. Six patients died without having received any benefit, and five others succumbed from complications. He uses tonics and antipyretics while continuing the inhalations. His formula is: Sulphide of carbon, 15 parts; phosphate of lime, 10 parts; water, 100 parts. Every eight or ten days he adds 5 parts of the sulphide until he reaches 30 parts, which he does not exceed. The apparatus should contain only six ounces of water; in cold countries it should be covered with cotton to assist the evaporation of the carbon; the apparatus must be well shaken to mix the ingredients; three or four deep inhalations should be repeated every three or four hours, later every two or three hours; the medicament must be renewed every eight or ten days, because the carbon is exhausted; if hæmoptysis supervenes, treatment

must be suspended until its complete cessation. In conclusion, he believes that this remedy has an undeniable and powerful action against pulmonary tuberculosis.—*Journal de Médecine de Paris*, 1892, No. 16, p. 195.

THE TREATMENT OF BONE AND JOINT TUBERCULOSIS BY IODOFORM-OIL.

DR. ERNST BÖHNI uses a 5 per cent. solution of iodoform in oil of sweet almonds in preference to a solution in ether, or emulsions in olive oil or glycerin. He washes the iodoform with a solution of sublimate, and sterilizes his oil by heat, and obtains a solution that is permanent. He uses cold applications for a day after each injection, brine baths, massage, and passive motion, believing that immobilization is detrimental. He reports twenty-eight cases, of which seventeen were completely cured, and ten essentially improved. He insists upon nourishing diet, and out-door life.—*Correspondenzblatt f. Schweizer Aerzte*, 1892, No. 9, S. 271.

THE TREATMENT OF SIMPLE PLEURISY BY SALICYLIC PREPARATIONS

DR. H. KÖSTER discusses this very interesting question from a clinical standpoint. Having studied the work of Tetz, Engster, Drzewiecke, Deri, and Edgren, he reports thirty-two cases, divided into two classes: 1. Primary pleurisies, lungs apparently healthy. 2. Secondary pleurisies. Of the first class, he obtained favorable results in seventeen cases of the twenty-seven treated. He employed the soda salt in twenty-two grain doses, the acid in fifteen-grain doses, three or four times daily. He believes that, taking the results together, this treatment is a valuable one, in that it is not dangerous, and that it should be employed not only in simple (non-purulent), but as well in secondary pleurisies.—*Therapeutische Monatshefte*, 1892, No. 3, S. 117.

THE TREATMENT OF PNEUMONIA BY DIGITALIS.

The favorable results reported by Petresco induced DR. RUDOLF HOEPFEL to treat fifteen patients with large doses. Besides the digitalis he made use of ice-bags, cold wet-pack, occasionally leeches, and in one case, for urgent œdema, venesection; with the exception of one case, he did not use the so-called antipyretics. He does not find that these massive doses are poisonous, but that in one or two days the temperature falls and the symptoms, dyspnœa and pain, disappear; that it shortens the duration of the disease two or three days; that astonishingly frequent is the termination by lysis (eight cases in fifteen). For this valuable operation of digitalis he furnishes an explanation that the dyspnœa is relieved by the increased force of the heart, but that it is only indirectly an antipyretic, and not a direct one, as was stated by Petresco.—*Therapeutische Monatshefte*, 1892, No. 4, S. 177.

THE TREATMENT OF DIPHTHERIA BY SULPHORICINATED PHENOL.

DR. A. JOSIAS, from his observations at the Hôpital des Enfant Malades, where careful bacteriological examinations of the false membranes, exudations, and even of the tonsillar mucus were made, concludes that this remedy is a very valuable one. The formula is 20 parts of phenic acid with 80 parts

of sulphoricinate of soda. The method of procedure is: Having dried the surface and false membranes, or having removed the latter by gentle pressure of cotton upon a carrier, apply over each false membrane cotton moistened in this mixture. This application is repeated five or six times each twenty-four hours. Besides, the mouth is irrigated with lime-water, in the hope of softening or detaching the membranes, and the nourishment is prescribed with great care; and further, in markedly septic cases, oxygen, by inhalation, is employed. These applications are well borne, and cause nothing more than a sensation of heat. When the cure of the diphtheritic angina is assured, the throat is painted three or four times daily with a mixture of salicylic acid in thirty parts of glycerin, and the mouth is washed with a 3 per cent. solution of boric acid. Of the thirty-three children treated, but nine died, one of them having been admitted *in extremis*.—*La Médecine Moderne*, 1892, No. 17, p. 253.

The Treatment of Diabetes.

Dr. Charles H. Ralfe believes that in protracted cases of diabetes there should be no relaxation of the restricted dietary; whilst the extreme sensitiveness to the minutest particle of starch and saccharine food exhibited when the glycosuria is still controlled by absolute restriction of the diet tells equally against its resumption. The next consideration is whether the advantages gained by a strict adherence to an absolute diet of proteid substances by diminishing the amount of sugar in the blood, and so checking the tendency to further lowering of the assimilative processes in the body and controlling the extreme diuresis, may not be gained at a too great expense to the patient's well-being, and that some benefit may be derived by permitting a slight relaxation from a too rigid proteid dietary, and whether its too long continuance is not in itself a danger by causing the formation in excess of bodies such as the morbid products of proteid metabolism. In diabetes with a flesh diet there is a positive entrance of an increased amount of acid salts into the body which at an early period of the disease are eliminated by the kidneys, but when the bodily powers begin to fail they accumulate to a dangerous extent. Added to this is the fact that with increased feebleness the power of digesting proteid material is lessened, and consequently the risk of the formation of toxic bodies in the intestines is increased. Admitting the risks attendant upon a proteid diet, it is not believed that any relaxation from it can obviate them. Two measures will be found to be of benefit, namely, in diminishing the amount of proteid material as the patient's powers of digestion fail, and in prescribing general and abdominal massage. So far as the opium treatment is concerned, so long as the glycosuria can be removed by diet it is unnecessary. When used it should be administered by the mouth, about an hour after the meal; the preparation to be used should be a combination of liquor opii with acetate of morphia in solution, and the dose should be one sufficient to entirely control the glycosuria, remembering, however, that diabetics are singularly tolerant of this remedy. So long as opium effects a reduction in the amount of sugar, we may safely increase the dose. If, however, the sugar excretion gains ground in spite of diet and opium, it is not wise to increase the dose.—*Lancet*, 1892, No. 3582, p. 902, and No. 3583, p. 961.

The Use of Digitalis in Aortic Disease.

In the *British Medical Journal*, 1892, No. 1628, p. 542, Dr. Alfred G. Barrs, after a very thoughtful discussion, concludes:

1. In all cases of valvular disease the chief desideratum in regard to the heart itself is the condition of the cardiac chambers in respect to dilatation and hypertrophy.

2. That the presence of symptoms in cardiac disease always means failure of compensation.

3. That the condition described as over-hypertrophy or over-compensation does not exist.

4. That the dangers in aortic disease arise from the same cause as the dangers in mitral disease, namely, failure of the compensation—that is, failure of the ventricular muscle to overcome the ever-increasing work put upon it.

5. That if digitalis is safe and beneficial in mitral disease, it is equally so in aortic disease.

Dr. Seymour Taylor argues from clinical experience that there is little or no comparison between the action of the aortic valve and that of the mitral, and that the theories advanced in the preceding paper are not orthodox (*British Medical Journal*, 1892, No. 1631, p. 705).

Ergotinine.

In *La Médecine Hypodermique*, 1892, No. 2, p. 17, Dr. Franck recommends the use of this active principle of ergot in place of ergotine, which is frequently inert and often untrustworthy. It is prompt, surer, and more constant, does not give rise to local accidents, and is useful in smaller dose—$\frac{1}{250}$ to $\frac{1}{120}$ of a grain. Nor, indeed, are these injections painful. Evetsky and Denslow have used it in acne. Alternating with hypodermatic injections of iron, it is useful in the menstrual disturbances of young girls. It has been used with good results in several cases of cerebral apoplexy, epistaxis, hæmoptysis, hæmaturia, hæmatemesis, and purpura hæmorrhagica. Haning has used it in suppository in hemorrhoids, and it is valuable used hypodermatically in this same condition when injected into the margin of the anus. Dujardin-Beaumetz has treated with success menorrhagias, Ducros has employed it for paralysis, and Payan for paraplegias. In lead-paralysis Hiter has obtained a cure in less than a month, giving also iodide of potassium. Payan, Allier, and Guersant, Jr., have treated paralysis of rectum and bladder, especially in old subjects, by this remedy.

Quinine Rash Produced by Very Small Doses.

Dr. Francis J. Shepherd reports a very unusual case in the *Montreal Medical Journal*, 1892, No. 9, p. 667. A robust man, aged forty-one years, who had frequently suffered from eczema and rhus poisoning, after taking three grains of quinine suffered from marked erythema of groins, inner sides of thighs, and lower part of abdomen. The skin was swollen and tender; purpuric spots were found in the red patches. On the next day the eruption had spread to the feet, and the hands were beginning to be affected. On the

wrists was a well-marked vesicular eruption. At the end of ten days desquamation began, flakes of skin coming from the thighs, but the skin from the palms of the hands and soles of the feet came away in one piece. There was at no time any elevation of temperature or other constitutional disturbance. One month later he passed through a similar attack after five grains of this remedy.

The Dye-treatment of Inoperable Malignant Neoplasms.

Prof. R. von Mosetig-Moorhof (*Wiener Klinik*, 1892, Heft 1) devotes a paper to this subject. Commencing with his first observations in 1883, using the trichlorate of aniline, he took up methyl-violet in 1890 (powder form; in ointment, ten, twenty, or a larger percentage, in diachylon or lanolin base; in solution one to five hundred, of which, one-half to three drachms, used by parenchymatous injection, every two or three days). The favorable results obtained are: 1, relief from pain; 2, improvement in general condition; 3, improvement in the mental condition; 4, improvement in the functions of the affected part; 5, lessening of the tumor. Untoward results are: 1, œdematous swellings; 2, development of foci of softening; 3, general conditions, as chilliness, fever. Ten cases are reported in considerable detail, the general conclusions being that the results have been favorable and that this method should be employed in the class of cases where radical treatment is impossible. In 1891 experiments were undertaken with carmine dissolved in water by the addition of an alkali (ammonia); the latter caused pain on injection, and was therefore abandoned. The formula recommended is 2 per cent. of carmine dissolved in 3 per cent. watery solution of soda. This solution seems to be absolutely harmless, and the pain caused by the injection is insignificant. On account of the more rapid diffusion of the coloring matter into the tissues the effect is more speedily obtained. It is likely that this remedy may, with benefit, replace the aniline colors. Three plates add much to the value of the paper.

MEDICINE.

UNDER THE CHARGE OF

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Enlargement of the Spleen in Young Children.

Dr. Walter Carr bases his paper on the observation of thirty cases in the Victoria Hospital for Children. The term "splenic anæmia" of Greis-

inger is adopted. The course, symptoms, and pathological anatomy of the cases appear to be sufficiently definite to entitle the disease to a definite name and place. The distinction must be made from the allied conditions of leucocythæmia and anæmia, and from spurious or real enlargements occurring in rickets.

Sixteen of the patients were males and fourteen females. The ages when first seen ranged from two months to two and a half years. They were usually more or less wasted. The skin was always more or less pale, with a characteristic waxy appearance and olive tint in the more severe cases. The spleen was always very hard, enlarged, and commonly to be made out on palpation. The liver was somewhat enlarged in about half the cases. There was usually some swelling of the external lymphatic glands.

In four of the fatal cases there had been epistaxis or purpura. Irregular attacks of moderate pyrexia also occurred from time to time.

In two cases a cloud of albumin was present in the urine, but the opportunity for examining this secretion was rarely afforded.

Examination of the blood in fifteen cases revealed a condition of simple anæmia. In one case only the increase in white discs approached the leucocythæmic condition after epistaxis (red corpuscles 37 per cent.; one white in thirty-three).

The author does not believe that rickets could account for the anæmia, though nearly all the cases were to some extent rickety, the diminution of red corpuscles being more marked than in that disease. The cases all run a chronic course, with death from exhaustion after hemorrhage, or from intercurrent pulmonary diseases; ten of the cases so died, six could not be traced, and thirteen either recovered completely or were steadily improving. The author does not consider the prognosis necessarily bad. Marked splenic enlargement and syphilitic taint are mentioned as two unfavorable factors.

Morbid anatomy. Necropsy was performed in seven cases; in one only was tubercle (mesenteric glands) found. No changes of importance were encountered in the liver. No enlargement of lymphatic glands of the thorax beyond what would be accounted for by the bronchitis and broncho-pneumonia present. The spleen was enlarged in every case, firm, and of increased consistence, with dark fleshy section, otherwise fairly natural in appearance. Microscopically the enlargement was seen to be simple hypertrophy with increase of fibrous elements. These appearances were the same whether the enlargement was associated with rickets, syphilis, or neither, and further resembled the spleen of ague. No definite microscopical changes were encountered in the liver or lymphatic glands.

Pathology. Ague, congenital syphilis, and rickets are considered *seriatim* as possible causes. The author's cases do not support the view that ague was a factor in causation, and a case of undoubted ague (with splenic enlargement) in a young child is quoted as presenting a marked contrast in the clinical history, and in its response to treatment, for there was marked and rapid improvement under quinine.

The evidence in favor of the connection of congenital syphilis is much stronger. In eight cases the infants were undoubtedly syphilitic, in six the evidence was doubtful, and in sixteen the evidence was negative. Seven in the first category proved fatal, and only three in the last. The author does

not share the views of Parrot as to the specific taint in rickets. His cases did not respond to mercurial treatment, and sometimes seemed to be aggravated by it. He concludes that though the connection with syphilis must be a close one, something further is required to adequately explain all the phenomena of the cases.

As regards rickets, twenty-seven of the children suffered from this condition—in four slightly, in the others more or less severely—but there are certain difficulties in the way of accepting a causal relationship: (1) In the great majority of cases no enlargement of the spleen can at any time be made out. (2) That there is no connection between the se verity of the rickets and the size of the spleen. (3) In certain cases of splenic anæmia there is no evidence whatever of rickets. The theory that in rickets the spleen may be specially selected, as if the disease spent its force in that direction rather than in any other (skeleton, etc.), the author is unable to accept, though fully admitting that rickets is essentially a general disease. The author, whilst admitting a close relation with inherited syphilis, and especially with rickets, which are very probably necessary predisposing elements, inclines to the belief that over and above these some further unhygienic conditions, hitherto unrecognized, must exist. No doubt, as syphilis and rickets both predispose to splenic anæmia, a combination of the two might be supposed to augment greatly the predisposition; but, if it be true that the condition may develop apart from these two cachexiæ, any theory which requires the combination of the two for its production can hardly be satisfactory.—*Lancet* 1892, Nos. 3582 and 3583.

Renal Dropsy.

Dr. W. Hawship Dickinson made the following communication on this subject at a recent meeting of the Royal Medical and Chirurgical Society. Although as a general rule the dropsy of renal disease varied inversely with the amount of urine, there were exceptions which suggested that other considerations must be introduced. Dropsy fluid was essentially the exudation from the capillaries which constitutes the lymph. If too much of this was poured out or too little carried off, dropsy resulted. There were two obvious agencies under which fluids passed through the capillary walls, and one which was hypothetical: (1) Filtration or transudation under pressure, acting on both colloids and crystalloids, albumin as well as salts; (2) diffusion or osmosis, acting on the salts, not on the albumin; (3) a secretory action on the part of the capillary wall, which had been inferred, but of which as yet we knew but little. The products of the first two processes must be different from each other, that of the third probably different from both. Dropsy fluids varied in composition more according to their position than their cause. Effusions in the serous cavities were always highly albuminous, though not equally so; œdema fluid was very slightly albuminous, whatever the disease to which it was due. The mineral salts were in much the same proportion, whatever the place and cause of the effusion. If the albumin were the issue of filtration and pressure, these agencies were active in dropsy of every origin; if the salts were evidence of osmosis, this process was much the same in all. In obstructive suppression, where cardiac failure was

obvious and low arterial pressure inferred, though urine might be totally absent, dropsy might be equally so. With nephritis dropsy was early and marked, arterial tension was increased, and the increase was borne out by early hypertrophy of the heart. The association of œdema and increase of tension were attributed to some condition of the capillaries due to abnormality of blood, which both hindered its passage and promoted transudation. This form of dropsy was commonly conjoined with obstruction in the lungs due to inflammatory change, but only a subordinate position was assigned to the venous retardation thus occasioned. Passing to chronic conditions a contradiction presented itself, for dropsy lessened with a further increase of arterial tension. This was commonly accompanied with increase of urine, but this did not necessarily remove dropsy, as was often seen in diabetes. Cases, tables, and cardiac diagrams were adduced in support of the position that the cardio-vascular change of advancing renal disease was the antagonist of dropsy. There was shown to be much dropsy with slight hypertrophy in nephritis; little dropsy and much hypertrophy with the granular kidney so long as the heart remained undilated; and, finally, on the stretching of the heart, increase of dropsy, and often pulmonary apoplexy. Pulmonary apoplexy was insisted on as a direct and simple result of advanced renal disease, irrespective of any lesion proper to the mitral valve. The relations of lardaceous disease to dropsy were considered, with the conclusion that this form of renal dropsy was brought about differently from that of nephritis and the granular kidney. The following conclusions were presented as not admitting of doubt: 1. Osmosis alone was not sufficient to account for dropsy, whether renal or of other kinds. 2. With the access of the dropsy of nephritis there was increase of arterial pressure. With a further increase of arterial pressure as the disease became chronic, and cardio-vascular changes were established, there was diminution of dropsy. 3. Finally the heart gave way, and mitral regurgitation, pulmonary apoplexy, and increase of dropsy resulted. Further deductions, advanced less confidently, followed. The connection between dropsy and uræmia was not simple, for the most extreme uræmia sometimes existed, while dropsy was totally absent. Neither had anæmia any necessary connection with dropsy, though often associated with it.

With the increased arterial pressure of nephritis, though neither the anæmia nor the hydræmia was as extreme as in other conditions, dropsy presented itself, and it was inferred that the process was essentially due to some change in the capillaries, produced by the state of the blood, of which obstruction and transudation were consequences. It was inferred that the obstruction belonged to the capillaries rather than to the arterioles. It was, of course, admitted that the arterioles were muscular and apt to contract, especially under nervous influences; but the capillaries would seem to be especially concerned in the process under consideration. What the nature of the capillary obstruction was must be left undeclared. Changes in the blood might affect its passage in many ways. Fluids of different sorts passed through inanimate tubes with different degrees of facility; besides which, the capillaries, though not muscular, had been demonstrated to be contractile. Proceeding to chronic disease and the granular kidney, the diminution of dropsy with the further increase of arterial tension required explanation. With this concurrence we had hypertrophy of the left ventricle, thickening

and narrowing of the arterioles, and increase of urine. It was submitted that the constriction of the smaller arteries must cut off the blood from the capillaries, and presumably lessen pressure in them and exudation from them. Further, that the thickening of the ventricle must necessarily increase its expansile power and suction action, and thus draw upon the pulmonary circulation and relieve the veins and interstices. Next came the beginning of the end in the yielding of the ventricle, regurgitation, increase of dropsy, and often pulmonary apoplexy. Putting aside lardaceous disease, the points of resemblance and of difference between renal and cardiac dropsy came into prominence. In both the accumulation, as is well known, was essentially, however modified, that which exuded from the capillaries and constituted the lymph. Under heart disease there was diminished absorption without any presumption of increased exudation, or not to any important extent. Under kidney disease there was increased exudation without any necessary or constant diminution of absorption. Both were essentially connected with modifications of blood-pressure—in one from obvious obstruction to the venous return, in the other from some presumably obstructive condition of the capillaries, which was attended with enhanced exudation from them, and associated with increased pressure within the arterial system.

Dr. George Johnson believed that the obstruction was in the arterioles. It had been abundantly proved that these were the regulators of the blood-supply to the various tissues and organs. He believed that the proximate cause of acute renal dropsy is the active elimination of retained urinary liquids and solids by a vital secretory process—an eliminative process intermediate, as it were, between the passive exudation which results from cardiac disease, and the more active *inflammatory* exudations which often occur during the progress of Bright's disease.

After referring at some length to the evidence derived from experiments as to the function of the arterioles, he concluded as follows:

There is proof that the arterioles can impede and arrest the circulation, but no evidence that the capillaries have that power.

There is no evidence of such increased intra-capillary pressure as would explain the occurrence of renal dropsy.

Capillary contraction, if proved to exist, would not explain the occurrence of dropsy. Intra-capillary pressure has probably as little influence upon renal dropsy as upon the inflammatory exudations which occur during the progress of the disease.

Acute renal dropsy is best explained by the active elimination of retained urinary excreta, both liquid and solid.

The dropsy which occurs in the final stage of chronic renal disease is often, as the author of the paper states, a result of heart failure; therefore truly cardiac, though not primarily of cardiac origin.

Dr. Pye-Smith admitted the weight of Dr. Johnson's views, but held that the author had raised a much wider question than the part played by the arterioles, which was now established beyond controversy.

He agreed with the author that cardiac dropsy was entirely due to pressure. Osmosis was a matter of passive effusion, and quite independent of pressure.

The explanation of cardiac dropsy was clear, but it did not serve to explain renal dropsy. In that disease there were really two separate dropsies—the one found in association with the large red or white kidney, the other the dropsy of the later stages of granular kidney. The later one was "hydraulic" and cardiac in origin, coming on when the arteries were soft and the cardiac hypertrophy had given way to dilatation. The early "renal" dropsy could not be explained in the same way. It might have some connection with the secretory power of the capillary endothelium. He thought there were several reasons for regarding its origin as something different from cardio-vascular disturbances. In his opinion, the early dropsy was probably not a dropsy at all, but an inflammatory effusion associated in origin with the other inflammatory effusions met with in Bright's disease. The interstices in the areolar tissue were as truly lymph spaces, and as such were liable to inflammation of the renal kind, as the larger lymph spaces of the pleuro-peritoneal cavity.

Dr. Douglas Powell agreed with Dr. Pye-Smith that the late dropsy of renal disease was in most cases a direct result of heart failure. He could not admit pressure as a direct cause of dropsy in renal disease, seeing that, during the period of highest tension, dropsy was not present.

He thought renal dropsy might be better regarded as a perversion of the osmotic circulation normally going on outside the capillaries, an excessive output including watery and saline materials which was supplementary to the diminished flow from the kidneys, and which had been found to contain some of the special salts normally secreted by the kidneys.

He could not accept the view of the inflammatory nature of the œdema, which was not supported by clinical evidence or by the characters of the fluid itself.

Dr. Broadbent could not admit that renal dropsy was ever, or in any degree, inflammatory. Were it so, it would probably be diffuse and less influenced by gravity. He had long held that the resistance which gave rise the physiological exudation of material for the nutrition of the tissues was situated at first in the capillary system, and not primarily in the arterioles. The additional obstruction, therefore, which gives rise to the dropsy in renal disease was also resident in the capillaries, and caused by some impurity in the blood. The late dropsy was undoubtedly due to heart failure. Without definitely accepting Dr. Dickinson's explanation of renal dropsy, he was greatly disposed to regard it as, in all probability, correct.

Dr. Sansom could not agree with the general conclusion of the previous speakers, that renal dropsy could be explained by dynamic causes. Dr. Wooldridge had demonstrated that dropsy would not occur in dynamic conditions of the blood very carefully brought about, unless some small amount of lymph products were injected into the blood. He urged that it was not difficult in renal disease to assume that resorption was likely to take place in view of an impeded excretion.

Enteric Fever Complicated by Suppurative Epididymitis.

Girode (*Archives Gén. de Méd.*, vii. 29, i. p. 43) has reported the case of a man, twenty-nine years old, in which, on what was estimated to be the

twenty-third day of an attack of enteric fever attended with pulmonary symptoms, the right epididymis was observed to be swollen, red, and hot. There was no evidence of the existence of urethritis; urination was normal. The pulmonary manifestations increased in intensity; death took place on the twenty-ninth day, from asphyxia. At the autopsy, swelling and ulceration of the agminated glands of the small intestine were found; the mesenteric glands, the spleen, the liver, and the kidneys were enlarged. The lungs presented the appearances of broncho-pneumonia; section gave exit to a small quantity of pus from some of the smaller bronchial tubes; there was no tuberculosis. The testicles were normal, but on the right side an interstitial epididymitis existed, with foci of suppuration. Cultures of the pus, as well as of fluid obtained from the spleen, resulted in the development of the bacilli of enteric fever; inoculation of two guinea-pigs was followed by death and the reproduction of the same organisms in the fluids of the animals. The evidence, positive and negative, points to the occurrence of bacterial emboli in the epididymis, with inflammation and suppuration.

SURGERY.

UNDER THE CHARGE OF

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A Case of Gunshot Wound of the Abdomen.

KRUNAR (*Indian Medical Gazette*, vol. xxvii., No. 2) reports the following case in which the œsophagus or stomach was manifestly wounded, but the bullet lodged in some locality where it produced no further mischief. The patient had a depressed wound with inverted edges, one-fourth of an inch in diameter, situated on the left side, between the sixth and seventh ribs, two inches outside of the anterior median line. There was slight contusion about the wound, and below it emphysematous crackling. There was a somewhat larger hole at a corresponding point in the patient's coat, but this seemed to have been caused by burning, and no part of the fibre could be found in the wound.

Immediately after admission the patient vomited about a pint of blood, this being the only emesis. The wound was dressed antiseptically, perfect rest enjoined, and ergot and sulphuric acid were given every three hours. Two

hours after admission the patient's temperature rose to 102°, but gradually subsided, becoming normal on the third day, and remaining so with one day excepted.

For the first week nothing was given by the mouth, except small bits of ice for the thirst. Nutrient enemata of milk and soup were given in small quantities at short, regular intervals.

On the eighth day liquid food was retained and was continued for ten days, solid food being taken and retained after that time. The ergot mixture was discontinued after two days, no more medicine except a cough mixture being given. The wound and its discharge remained aseptic, and no foreign body was ever discovered in the stools, which were perfectly healthy and regular, except at first, when they were slightly blood-stained. The patient was discharged one month and four days after admission entirely cured.

The Topical Treatment of Cystitis by Corrosive Sublimate.

Guyon (*Annales des Mal. des Org. Génito-urinaires*, 10e année, No. 1) arrives at the following conclusions, based upon his observations and the results obtained by the topical application of corrosive sublimate in the following twenty-six cases of cystitis:

Of ten cases of tubercular cystitis, five were greatly ameliorated; two of these he would call cured if it were not for the difficulty of exact diagnosis and the well-known tendency to relapse in all conditions of tubercular origin; and he lays special stress upon the fact that in these cases the corrosive sublimate was well borne, the reverse being true of all other medicaments whose topical application he had studied. Of seven cases of gonorrhœal cystitis, four were cured, one ameliorated, and two were unsuccessful. Two cases due to prostatic enlargement were speedily ameliorated, and one case of pseudo-membranous cystitis was cured.

He found that an inverse ratio exists between the number of micturitions and the capacity of the bladder, and that it has a physiological, not an anatomical capacity. This led him to use instillations instead of lavages, drops instead of drachms, and he obtained by these methods, using solutions of equal strength, entirely different results. He draws the following conclusions from the work of Hallé regarding the antiseptic power of corrosive sublimate: It is powerful against microbes of the air; weaker against the microbes of the urine than against the ordinary pyogenic microbes; and very weak in its antiseptic power over purulent urine, only acting when used in enormous doses. He found the nitrate of silver less powerful over the microbes of the air; but greater over the microbes of the urine than on the ordinary pyogenic microbes, though in neither case was it as efficient as the sublimate, while the same is true of its power over the microbes of purulent urine when used in proportionate doses. With regard to the efficiency of the sublimate in destroying the bacillus of tuberculosis, he believes that the great amelioration amounting almost to absolute cure, in the cases of tubercular cystitis, confirms the belief that it is the most active agent we possess, and the culture-experiment of Hallé demonstrated the fact that the presence of sublimate in a gelatin culture, even in the form of an albuminate, prevents the growth, although it does not destroy the tubercle bacillus.

With regard to the effect of these germicides upon purulent urine the experimentation shows that it is impossible to apply either remedy with hope of success, where there is purulent urine. He gives the following as his method of treatment. He believes that instillations should be substituted for lavages, as the sensibility of the bladder both in its normal and pathological conditions is dependent upon the distention of its mucous membrane, and he finds that by this method he can more easily increase the strength of his solution while lengthening the time of its retention. The instillations are made in the ordinary manner; the fluid should be introduced into the posterior part of the urethra, as this part always participates in any cystic inflammation. The solutions should be made of boiled distilled water, and must be made without alcohol. The bladder must be void of urine, a catheter being used if required. The first instillation should not exceed 20–30 drops of a 1 : 5000 solution, and may be increased in quantity to one drachm, and in strength to 1 : 1000. This he considers the limit of safety, although the dosage both as to quantity and strength is entirely relative, and depends on the sensibility of the bladder, excessive pain demanding weaker solutions, while inability to retain the solu tion is the indication for a lessened quantity.

In all his observations he has seen no harmful results from this method of treatment.

Retro-pharyngeal Abscess in Infancy, and its Treatment.

Four cases of acute retro-pharyngeal abscess are reported by Pollard (*Lancet*, Feb. 13, 1892), and the following operation described:

"An incision about an inch in length, and about an inch below the mastoid process, was made along the posterior border of the sterno-mastoid. After the fascia covering the muscles in the floor of the posterior triangle was exposed, a cautious dissection with blunt instruments was made behind the deep vessels and nerves of the neck until one finger placed in the wound almost met another placed in the pharynx. A director, guided by the finger in the pharynx, was then thrust into the abscess, and the opening enlarged by passing a pair of dressing forceps in and forcibly separating the blades. A drainage-tube should be inserted, and care should be taken that it does not slip out of the abscess cavity."

Desmoids of the Abdominal Wall.

Bodenstein (*Münch. med. Wochenschr.*, xxxix., No. 1) adds to the literature of this subject and the 100 cases collected by Ledderhose, 21 cases, reporting the following case which came under his care. The patient, during pregnancy, felt a distinct tenderness over the uterine region, but ascribed it to her condition; but on observing, after the birth of her child and the delivery of the placenta, that there still remained a large tumor in that region, she sought the hospital. Supposing the tumor to be abdominal an incision was made in the linea alba, when it was discovered that the tumor lay in the abdominal wall, though closely adherent posteriorly to the peritoneum, from which it was with difficulty dissected. The tumor weighed about three and a half pounds and gave a peculiarly harsh sound when cut with a knife. The microscopical structure showed the tumor to be of a dense fibrous char-

acter, similar to connective tissue. In the 21 cases he collected in addition to those of Ledderhose, of 18 fibromas, 12 had their point of origin in the recti and their sheaths; the other 6 arising from the oblique muscles. The other 3 were sarcomatous in character, and apparently fibro-sarcomas springing from and directly connected with the recti.

The Schwalbe Treatment of Hernia.

Steffen (*Correspondenzblatt für Schw. Aerzte*, xxii., No. 2) discusses the report of Heidenthaler in regard to the results obtained in Billroth's clinic in the treatment of herniæ by the method of Schwalbe. He says the poor results are due: 1. To the shortness of the treatment. 2. To the fact that the injections were made without sufficient intervals intervening, and therefore produced an acute inflammation and inflammatory products that were easily absorbed. 3. They were too few in number and too near together. The treatment is one more applicable to private practice and dispensary work, where patients can be under treatment for a long time with long intervals between the injections, producing a chronic inflammation with the production of connective tissue, than it is to hospital practice where the patient occupies so much time and where the methods of Macewen and Bassini produced quicker results. He describes his own method of procedure, with which he has obtained favorable results with the treatment of Schwalbe.

The Treatment of Intra-mammary Abscesses.

Hache (*Rev. de Chir.*, 12e année, No. 3) recommends the following as a means to procure the rapid healing of these abscesses:

1. After antiseptic precautions the most important procedure, as in all other abscess cavities, is the procuring of perfect drainage.

2. The compression, uniform and firm, of the gland is the best means to accomplish this end, the position or declivity of the incision being of little importance.

3. To produce this uniform and sufficient pressure concentric compression directly of the gland should be joined to the classic method of pressure against the thorax.

4. Drainage-tubes should be avoided as much as possible, as they render the compression painful and retard the healing.

5. Where the abscess is superficial and only covered by a thin layer of tissue, it should be incised in this point. The thinness of the walls renders the use of drainage-tubes unnecessary. He reports four cases in which this method of treatment by compression pròduced rapid cures with restoration of the secretive function.

Tubercular Disease of the Shoulder-joint.

Mondan and Audry (*Rev. de Chir.*, 12e année, No. 3) give the following *résumé* of the conditions found to be present in 43 cases of tubercular disease of the shoulder-joint which they have had under observation, and in 32 cases have made anatomical studies of the resected portions, as also the conditions found present at the operation. Tubercular disease of the shoulder in adolescents and adults is osseous in character and originates in the humerus, although

lesions of the surrounding tissues are not rare. The tubercles are most frequently found in the epiphysis, generally in the head or surgical neck, and are multiple. They may be central, but the proportion is nearly two to one in favor of the peripheral lesion, where they develop beneath the cartilage or in the cervical groove. The dominant form of tubercle is the caseo-fungous. Sequestra are not rare in the humerus, nor is the infiltration by tubercle of its head. There are two distinct forms of disease: the one moist, rapidly evolved with or without fistulæ; the other dry, with a tendency toward atrophy and ankylosis, slow in its course of development, and characterized by constant pain. They believe that in every fifty cases of tubercular arthritis there is one of shoulder involvement. The age at which this disease may develop is not fixed. In their cases it ranged between eight and seventy-one years, although the majority of the patients were about twenty, or at the age corresponding to the osseous union of the epiphysis and diaphysis, which is the latest of unions. They found that traumatism has no direct influence in causing the outbreak of disease, as in 43 cases only 9 could substantiate a history of traumatism. In marked contrast to the historical description of white swelling, which is the attribute of all tubercular joint disease, they find that in tubercular arthritis of the shoulder there is always marked atrophy of all the muscles, but especially of the deltoid, which is markedly atrophied and suffers a loss of function, if it is not entirely destroyed, its thinness permitting the direct palpation of the head of the humerus. The differential diagnosis is to be made from rheumatoid arthritis, the history of the case and family tendency are the best guides, while the fact that 90 per cent. of these cases are tubercular makes that the more probable form.

The Enucleation of Goitre.

Reverdin (*Revue de Chirurg.*, 12e année, No. 3), writing on this subject, says: "It must not be forgotten that despite the amelioration in statistics, thyrodectomy is an operation that often leaves a cadaver in the hands of the operator;" and continuing, he formulates these as the indications for operation: "When iodoform and all other recognized effective medicinal treatments have done all they can for the symptoms which continue rapidly or slowly to increase, as suffocation and intermittent or persistent pain, surgical intervention is indicated." He reported fourteen cases, in which the sexes were represented by five men and nine women. The ages varied from twenty-one to fifty-eight years, thirty-five years being the average. The position of the goitres was ten of the right lobe, and two each of the isthmus and the left lobe. He suggests as a hypothetical reason for the predilection shown for the right lobe, the greater liability of congestion on that side when there is any effort as a cause for it, present in the system. He classes the goitres from the clinical aspect as five parenchymatous, six cystic, and three adenoid. He considers enucleation preferable to partial extirpation, his experience in this series of cases having demonstrated the greater utility and better results without sequelæ of the former method, and although in this series he did seven enucleations and seven partial extirpations, he draws attention to the fact that six of the partial extirpations were done in the first seven cases, and that since his ex perience has taught him the difference, he prefers to perform

the enucleation. Comparing the duration of time in the two operations, and the length of convalescence, he finds that the enucleations averaged twenty-six minutes, including dressings, and healed in seven days, while the partial extirpations required sixty-two minutes and only healed after fourteen days. All his patients recovered, except one; this one was a woman, aged seventy years, whose trachea was so involved and softened by disease that even tracheotomy could not save her, and this case he believes reflects no discredit either upon the operation, its method, or the surgeon. He considers the operation one of necessity rather than of choice, and believes that the surgeon should always attempt enucleation, as it has the advantage of being the shorter operation, and produces the more rapid cure without the danger of sequelæ.

Catheterization of the Biliary Ducts.

After a lengthy discussion of the normal anatomical structure and the pathological changes produced in the biliary ducts and their relations to catheterism, Terrier and Dally (*Revue de Chirurg.*, 12e année, No. 2) come to the following conclusions: 1. In general the catheterization is easier under pathological conditions, especially when the ducts are dilated by a stoppage in the valves or at the distal end of the cystic canal. 2. Nevertheless, in many cases, owing to the curvatures in the canal, the persistence of the valves or the opening of the duct upon the lateral wall of the sac, the catheterism is difficult. 3. Often the difficulty is insurmountable, often there is none. 4. Rules for the passage of the catheter are impossible, owing to the variations in the anatomical relations. The only way is to attempt the catheterism with a clear idea of the normal relations for a guide. 5. Forced catheterism, even with a finger externally to direct the instrument, is difficult and in all cases dangerous. 6. The treatment is not well enough understood as yet for its value to be appreciated. 7. The instruments to be used are olive-pointed bougies and Bénique's catheters, with or without stylets. Liver catheters are of rare use. 8. In all these operations strict antisepsis must be observed.

The Treatment of Gunshot-wounds of the Spinal Column.

Vincent (*Rev. de Chir.*, 12e année, No. 2) divides these wounds into three classes, and counsels surgical intervention, under antiseptic precautions, in all cases. His classes, with their treatment, are as follows:

1. "Simple compression of the cord by an extravasation of blood by a fragment of bone or by the projectile situated outside of the medullary canal." This is admittedly the most favorable condition for surgical intervention, and he believes that in every case the removal of the projectile from the neighborhood of the spinal canal exerts a beneficial influence upon the inflammation.

2. "The projectile has passed completely through the vertebral column, injuring the cord." If this diagnosis could be established there would be little need of operation; but in the generality of cases it cannot be, and there is usually some foreign body or splinter of bone remaining in the canal, and he advises always the division of the soft parts and a thorough exploration of

the conditions present. There is but one contra-indication, and that is a coexistent visceral lesion that endangers the life of the patient.

3. "The projectile is entirely or partially lodged in the spinal canal." Although success in these cases is rare, he believes surgical interference, under antiseptic precautions, does not aggravate the danger and justifies surgical operative measures on the following grounds:

The presence of a foreign body in the medullary canal is a certain cause of irritation leading to myelitis and meningitis, and many patients recovering from the paralyses succumb to cysto-nephritis or septic complications and nutritive derangements created by this myelitis. By the removal of the foreign body and the antiseptic cleansing of the wound in the spinal column, the development of these inflammatory complications is hindered, if not entirely prevented.

In conclusion, he says that surgical intervention has contributed to save many wounded in these cases, that are in prognosis so very grave, and that no matter what the injury, if there exists no visceral lesion surgical interference is indicated in all cases where the lateral or posterior situation of the injury makes it accessible—even trephining the canal if it is necessary to remove a foreign body.

Compound Fracture of the Skull and Wound of the Arm Centre.

Williams details (*New York Medical Journal*, vol. lv., No. 2) the case of a male negro, aged twenty-three years, who, two days before admission to the hospital, had received a blow on the right side of the head, producing a compound fracture of the right parietal bone with comminution and depression at the centre of the Rolandic region. Temporary unconsciousness followed, with paralysis of the left arm below the elbow. There was slight motion of the shoulder and elbow. Intelligence was unimpaired and sensation was normal.

The depressed bone was circular in shape and about as large as a silver half-dollar. Thirteen fragments of bone were removed; some of these were imbedded in the brain. There was some loss of brain substance. After cleansing, a rubber drain was introduced, the wound closed with catgut sutures, and a sublimate dressing applied.

After recovery from the anæsthetic, abnormal sensations were complained of in the left arm and leg. The wound suppurated. Slight motion appeared in the fingers of the left hand on the fourth day after operation. During the next six days the patient was somnolent with occasional delirium, and had at times a severe tremor of the whole body. Constant pain was complained of in the back of the neck. Hernia cerebri developed, and the mass was shaved off three times. Elastic pressure was applied, and no further trouble was experienced. On the forty-seventh day the tongue was seized with clonic convulsive movements. The dressing was removed and the gauze packing withdrawn, when the spasm ceased at once. Three days later clonic spasms of the left arm and leg occurred, lasting fifteen minutes. The condition of the patient when discharged was as follows: Motion at shoulder almost normal; can flex the elbow and wrist; pronation and supination imperfect; can flex the fingers, but cannot completely extend them; fingers all partially anæs-

thetic, but not analgesic; perception of heat and cold normal; tactile sense impaired; picks up articles with difficulty; marked rigidity of muscles of left arm and forearm, which becomes more marked when voluntary motion is attempted; can stand on left leg for a few moments only; knee-jerk and ankle clonus increased on this side. The patient is working, and is able to manage a dump-cart.

A Case of Intestinal Occlusion by Torsion of the Large Bowel; Laparotomy.

Villar reports (*Journal de Médecine de Bordeaux*, 1892, No. 4) the following case: A deaf-mute, female, aged about forty years, of very constipated habit, on the 16th or 17th of August evinced distress in the abdomen. Purgative medicines were given without effect. Enemata likewise failed to cause an action of the bowels. One week later, the patient was sent to the hospital in the following condition: The expression was drawn, the tongue was rather dry, the pulse fair, the abdomen irregularly distended. Operation was decided upon.

After anæsthesia the parts were thoroughly cleansed, and an incision made in the linea alba from just below the umbilicus to just above the symphysis pubis, and the peritoneum opened in the usual manner. The intestinal mass was rapidly and thoroughly examined, beginning at the cæcum; first the small intestine, and then the large intestine was inspected. The former seemed normal, the latter was much distended. Behind a voluminous loop was seen a large fibrous band, which was resistant and did not permit of the introduction of a finger between it and the bowel, which it constricted. It was observed that in rotating the loop the band disappeared, only to return again on replacing the bowel as it was found, demonstrating, therefore, occlusion of the bowel from torsion.

The volvulus was at the level of the sigmoid flexure, which is the most frequent seat of torsion.

The sigmoid flexure had described a rotation from left to right, embracing the colon, and forming a close knot, which would have been difficult to remove except by direct manipulation. The large intestine formed the constricting band. Fecal matter was passed *per anum* when the intestine was untwisted. The bowel showed a tendency to resume its former twisted condition, owing to the low position of the transverse colon. The abdominal incision was, therefore, continued upward, and the transverse colon fixed to the abdominal wall by seven heavy catgut stitches, on a level with the greater curvature of the stomach. The abdominal wound was closed, and iodoform dressings applied. The temperature did not rise above 37.8° C. There was no vomiting, and the patient had a natural stool. A little soup was given by the mouth. The case progressed favorably until the evening of the fourth day, when the temperature rose to 38.9° C. The patient gradually became weaker, and died on the seventh day. The abdomen had remained flaccid, and was free from pain on pressure. The author does not think the operation is responsible for the death, but believes life would have been preserved by earlier interference.

In concluding, medical treatment is advised first, but surgical measures are

not to be too long delayed. Attention is also called to this operation in any case of enteroptosis.

Removal of a Calculus from the Vermiform Appendix; Recovery.

Pinnock reports (*Australian Med. Journ.*, vol. xiv. No. 1) the case of a man, aged nineteen years, who was suffering from the usual symptoms of perityphlitis. Belladonna was applied externally and administered internally, and under this treatment the patient improved for some days, but became worse again, having obstinate constipation and vomiting matter with a fecal odor. An exploratory operation was decided upon. This was done seventeen days after the beginning of the illness. The incision was made in the linea alba large enough to admit the hand. Numerous adhesions were encountered, and a small cupful of pus and a quantity of feces evacuated. The vermiform appendix was found bound down by adhesions. It was found to contain a calculus, which was removed. A glass drainage-tube was inserted, and the wound closed with deep silver-wire and superficial horse-hair sutures. At the end of fifty hours a rubber tube was substituted for the glass one.

The calculus weighed fourteen grains, measuring half an inch in diameter and six-sixteenths of an inch in thickness. It was formed of phosphate of lime, with some oxalate of lime, and was arranged in concentric layers.

Reference is made to two similar cases, recorded by other observers.

Of 125 cases of ulceration of the appendix examined by Fenwick, a concretion, mass of feces, or other foreign body was found in but 55. In 47 of these, 28 were concretions, 14 hardened feces, and 5 seeds or shell. In 200 dissections, Ferguson, of Toronto, found foreign bodies in the appendix 15 times.

OTOLOGY.

UNDER THE CHARGE OF

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Impacted Cerumen Invading the Mastoid Process and Producing Facial Paralysis.

Dr. James W. Dalbey, of Cedar Rapids, Iowa, found in a man fifty years old, sent to him for examination, "the right external auditory canal completely filled with a black, hard mass of inspissated cerumen. . . . . The impacted cerumen was removed by a current of warm water and the use of the curette and hook, revealing complete destruction of the membrana tympani and disappearance of the ossicles [probably from an old purulent

process in the ear.—REV.]. There was also a sinus opening from the auditory canal into the mastoid cavity. From the mastoid cavity—there having taken place absorption of all its cellular elements—a large quantity of wax, desquamated epithelium, and a small quantity of pus were removed. Immediately a marked improvement in the facial condition ensued. In the course of four or five days the muscles of the face contracted normally. The pressure on the seventh nerve was supposed to have occurred "in its passage through the mastoid." The facial paralysis had lasted two months, when finally relieved.

NYSTAGMUS IN AURAL AFFECTIONS.

DR. MICHAEL COHN reports a case of the above-named rare occurrence (*Berliner klin. Wochenschrift*, 1891, No. 43). In Baginsky's public clinic for ear, throat, and nasal diseases, in Berlin, a woman, forty-six years old, presented herself for relief of a discharge from the left ear, associated with attacks of vertigo and nystagmus. Gentle pressure on the tragus of the affected ear, syringing the ear, and compression of the air in the external auditory canal with an inflation balloon instantly produced vertigo and nystagmus. When the canal was lightly filled with cotton no form of pressure on the column of air in the auditory canal was able to call forth the aforesaid phenomena.

OPERATIVE MEASURES FOR THE RELIEF OF IMPAIRED HEARING.

DR. E. B. DENCH, of New York, after reviewing the work in the above named direction of Politzer, Kessel, and Miot, in Europe, and Blake, Sexton, and others in this country, gives his own experience in some interesting cases (*Archives of Otology*, vol. xx. No. 1). In Case I., a man twenty years old, the stapes was freed, by incisions around its head, from a dense fibrous tissue formed as a result of a chronic purulent otitis media. The hearing was improved and the discharge ceased.

In Case II., a boy of twelve, the border of an old perforation covered and bound down the incudo-stapedial joint. Severance upward, one-sixteenth of an inch, was followed by improved hearing, as the stapes was free to vibrate in and out of the oval window.

In Case III., a girl of sixteen, the malleus, which was bound down to the promontory in consequence of adhesions following a chronic purulent otitis media, was cut loose. The hearing increased a little for the watch.

Case IV. In a man, twenty years old, it was found that an acute purulent otitis media had destroyed the entire membrana vibrans, and that the malleus handle was drawn backward and upward toward the head of the stapes, where it had become attached by a firm adhesion. "Division of the band rendered the hearing of articulate speech in this ear practically normal."

In none of the cases reported was there any inflammatory reaction, and the pain was insignificant. "It seems but just to our patients, therefore, in any case where there is a possibility of improvement by simple operative measures not attended with risk, to give them the benefit of the doubt, after explaining that, in any given case, the amount of improvement is largely a matter of conjecture. In cases, also, not dependent upon suppurative disease,

but upon catarrhal inflammation with the formation of adhesions within the tympanic cavity, it seems that we are justified in opening the tympanic cavity —using antiseptic precautions—and to attempt to liberate the ossicular chain either by disarticulation of the incudo-stapedial articulation, the division of existing adhesions or by *brisement forcé*, the latter after the method of Miot."

Opening the Mastoid through the External Auditory Canal.

Dr. Hessler, of Halle-am-Saale, at the Tenth International Medical Congress, reported, by request of the committee, upon the question, "Can the opening of the mastoid from the external auditory canal be considered as good as other methods in vogue?" (*Archiv f. Ohrenheilkunde*, Bd. xxxi. Heft 1). He first gives an account of the four usual methods of opening the mastoid and the middle ear, viz.: That of Schwartze—the oldest and the most usual—consisting in chiselling off successive layers from the corticalis of the mastoid until the antrum is reached. 2. That of Wolf, consisting in penetrating the bony partition between the antrum and the external auditory canal by successive layers after the soft parts are removed, just as though the auditory canal were to be widened posteriorly. 3. The method of Küster, consisting in making an opening in the posterior wall of the auditory canal, in cases where some of the membrana and the ossicles are still retained, as far away from the membrana as possible. However, if the drum-cavity is filled with granulations and the membrana and ossicles largely or entirely destroyed, Küster advises carrying his incision through the bone into the drum-cavity, so as to remove with a sharp spoon all morbid material during direct inspection. Then a drain or an iodoform tampon is inserted. He discards repeated or prolonged syringing after the operation, as suppuration is greatly diminished by the operation. 4. The method of v. Bergmann is then considered. This consists in making a long, crescentic incision from above and in front of the auricle backward and downward, and then loosening the periosteum from the entire osseous auditory canal. Beneath the linea temporalis the thick bony partition between the auditory canal and the middle cranial fossa is penetrated with a chisel as far as the bony annulus tympanicus, without, however, entering the cranial cavity. Now, by means of the chisel the incision is carried further backward toward the mastoid process, in order, from here in an oblique direction, to penetrate that part of the pars tympanica forming the posterior wall of the bony auditory canal. Great care is exercised to avoid too deep a penetration and also injury of the facial canal; then tamponade of iodoform. In two days drainage-tube inserted in the depths of the drum-cavity.

All operators, with their different methods, have obtained successful results. It seems, therefore, that no one method is sufficient for all forms of tympano-mastoid disease, but that the methods must vary with topographic-anatomical variations.

Wolf's method is not much used, and is difficult. The narrow limits of the field of operation make it hard to avoid injury to adjacent parts, and subsequent irrigation cannot be thoroughly carried out. It is indicated (1) for subperiosteal removal of exostoses and hyperostoses of the auditory canal; (2) in caries in the upper and back part of the auditory canal; and (3) when-

ever the transverse sinus extends so far forward into the field of the operation that the operator is forced to work very far forward on the posterior wall of the auditory canal in order to avoid the sinus.

Küster and v. Bergmann object to the method of Schwartze because they claim that by chiselling alone only the antrum is reached; that this can have little beneficial effect upon a profound osseous suppuration in the middle ear, and that the surgeon must do more than keep up, as after-treatment, an untiring antiseptic syringing of the tract of the operation. Drainage, and letting the operated field alone, is recommended by Hessler. Syringing is objected to as dangerous, because it does not prevent the entrance of the disease into the brain-cavity, but in many cases it perhaps favors it. It is urged that the injected stream of boric acid or carbolic acid solution may force septic material through non-suppurating though softened bone-tissue surrounding the brain. Also, the leaden peg is to be abandoned, as it may interfere with drainage, promote the growth of polypoid granulations, and cause great vertigo and even vomiting.

A combination of the methods of Schwartze and v. Bergmann answers all the demands of aurists and surgeons. Every chiselling of the mastoid should be begun in the manner of Schwartze, and will be sufficient if the caries is limited to the mastoid process and the antrum. If it extends further forward between the lamellæ of the squama, then the middle ear must be opened after the method of v. Bergmann. Thus, a free communication may be established between the antrum, the attic space, and external auditory canal.

Hessler states that before Küster's work was published he had in six cases removed the entire posterior wall of the bony auditory canal as far as the tympanic cavity, and had also removed with it a portion of the squama. This was done three times in acute and three times in chronic purulent otitis media with caries in the mastoid process, and once in connection with cholesteatoma in the antrum and middle ear. In all cases cure finally ensued.

A Case of Abscess of the Temporal Lobe; Recovery.

Drs. A. Baginsky and Theo. Gluck report a case of abscess of the temporal lobe, due to purulent otitis set up by the insertion of a pea in the ear of a boy five years old (*Berliner klin. Wochenschrift*, No. 48, Jahrgang xxviii.). The history of the case revealed the following facts: The boy, after having put the pea in his ear, was taken to a children's hospital in Berlin, where vain endeavors were made to remove the pea, by syringing. Some days later the patient was brought back to the hospital with an otorrhœa. An aurist, Dr. B. Baginsky, now examined the ear, detected the pea lying upon the membrana, and removed the foreign body with a small hook. The slight discharge ceased under treatment, in a few days. Two or three weeks later the child manifested fever and headache, according to the parents' statement, which symptoms became worse at night. Suddenly, during an attack of fever and headache, there occurred a clonic spasm, with partial loss of consciousness. The family physician discovered the following conditions: A somewhat *slow* and *irregular pulse*, intense headache on the side of the head corresponding to the wounded ear, slight retraction of the belly, slight twitch-

ing in both hands and feet, with moderate opisthotonus, and slight somnolence.

Examination of the ear revealed absence of all suppuration, and that there was a large perforation in the membrana. Frequent repetition of these symptoms led to the suspicion of an incipient meningitis, and the child was again taken to the children's hospital, about three weeks after the pea was introduced into its ear.

Dr. A. Baginsky now examined the child most carefully, but found no essential cerebral disturbances. For nine days there was nothing abnormal observed in the patient. Then, however, it was observed for the first time that the left pupil—the side of the affected ear—was somewhat smaller than the right. However, both pupils reacted normally; but, at the same time, the miserable expression and the *emaciation* of the child became striking. Then irregularity and slowness of the pulse—sixty-four in a minute—were observed, while the temperature remained normal, as it did throughout the *entire* illness. The child began to complain of headache, which could not be localized. Four days later it was discovered that the left temporal region was sensitive to the lightest touch. But there was nothing abnormal discovered in sensibility or mobility which would have to some extent indicated a central lesion. Good, and then bad, days succeeded for five days more, the pulse falling to fifty-eight, then rising to seventy-nine, to fall again to sixty-eight, the respiration being but slightly affected. Now, about six weeks after the injury to the ear, the condition of the patient suddenly changed. The child began to sleep badly, was restless at night, and complained of great headache, not localized, however. His appearance was wretched, pulse irregular and slow, and at times his sensorium was observed to be affected. He voluntarily lay in bed; his hearing appeared to be good, but his answers were short and indistinct, and, finally, in the course of a day the child developed a condition of peculiar apathy, and lay in bed with his arms and legs drawn up to his body. The neck was stiff, and the head was thrown back; the pulse was very irregular, and sank as low as fifty-two; the sensorium was clear for only a few moments at a time; the child cried out loudly from time to time, but was mostly in deep sleep. There was no engorgement of the papillæ. Abscess in the brain was now plainly diagnosticated, seven weeks after the injury, but there was nothing beyond analogy to place its seat in the temporal lobe. There was no paralysis nor even weakness of the arm on the opposite side.

Dr. Gluck, by request, performed the operation for opening an abscess in the temporal lobe, and found a large quantity of pus in an abscess in the temporal lobe of the left side. The child at no time had fever; he began to play the same day. Soon after the operation his pulse began to increase in frequency, and reached eighty-four the second day after the operation, and the respirations were normal. A few days after the operation a slight facial paralysis was observed on the left side, which, however, soon disappeared. The child also would repeat automatically twenty, thirty, and forty times a single word which had been said to him. The left ear still showed a slight discharge and a large perforation in the membrana. Otherwise the child was entirely well three months after the operation, when the case was shown to the Berlin Medical Society.

On the Function of the Cochlea.

Dr. C. Corradi, of Verona, having performed a number of experiments, chiefly upon the cochlea of guinea-pigs, draws the following conclusions:

1. It cannot be shown with certainty, that in the human labyrinth there are other parts besides the cochlea, in which acoustic impressions can be made. In guinea-pigs, total destruction of the cochlea in both ears is followed by absolute and permanent deafness.

2. Partial destruction of the cochlea does not lead necessarily to complete and permanent deafness. It sometimes happens, therefore, that either immediately after the operation or some time after it hearing is again observed, which must be ascribed to the remaining uninjured parts. When hearing returns not until some time after the operation, the delay must be ascribed to shock, extravasation of blood, or reactive inflammatory disturbances in the remaining parts of the cochlea.

3. It is very probable that the perception of the variation in pitch of notes depends upon different parts of the cochlea; the deeper the note the nearer the cupola lies the portion of Corti's organ perceiving it.—*Archiv für Ohrenheilkunde*, vol. xxxii. pp. 1–14.

A New Boric Acid Preparation in the Treatment of Chronic Purulent Otitis Media.

Dr. Max Janicke, of Görlitz, recommends the use of a neutral borate or tetra-borate of soda, in the treatment of chronic purulent otitis media. This preparation is obtained by heating equal parts of boric acid, borax, and water. Upon cooling, the precipitate will be found to be neutral in reaction. It is soluble to the extent of 16 per cent. in water at the ordinary temperature of the room, while in boiling water it is soluble to an almost unlimited extent. This salt possesses the valuable peculiarity that, unlike other salts, it does not precipitate from its hot concentrated solution immediately upon cooling. Precipitation does not occur for some time after cooling, so that solutions of 50 per cent. may be used in the drum-cavity. Thus, a large quantity of an antiseptic material can be introduced into and kept in the drum-cavity for a long time. Once in twenty-four hours is often enough to apply the solution in cases of moderate discharge, while in slight discharges less frequently will answer. The neutral borate of sodium is extremely mild and unirritating. After the use of the above-named solution in cases of large perforation in a total of the membrana tympani, some of the same neutral salt may be blown into the ear.—*Archiv für Ohrenheilkunde*, vol. xxxii. pp. 14–24.

Three Cases of Acute Otitis Media Followed by Acute Caries of the Mastoid Process, After Measles.

Dr. M. Bolt, of Groningen, Holland, observed and reported three cases of the above-named nature during an epidemic of measles (*Archiv für Ohrenheilkunde*, vol. xxxii. pp. 25–28).

The first case was that of a girl, aged two and one-half years, who began to show prodromes of measles. Before the eruption appeared an acute purulent otitis media, with intense pain, occurred in the left ear. In the course

of a few days, mastoid tenderness and swelling set in. The swelling increased rapidly, fluctuation was felt, and the abscess opened into the external meatus. A large subperiosteal abscess being found in the mastoid, the corticalis was broken open with the chisel and removed, the mastoid cavity being found filled with granulations. The latter was scraped with a sharp spoon, so that communication was established between the antrum and the middle ear and the external auditory canal. The wound was packed with iodoform gauze. Two days after the operation the eruption of measles appeared, and the disease ran its course without interruption. In ten days the wound in the mastoid was permitted to cicatrize. A little discharge continued from the ear, due, apparently, to a small sequestrum in the auditory canal.

The second case was that of a boy, five years old, in whom, it was stated, the aural disease began during desquamation, after measles. In this case a burrowing abscess, starting from the posterior wall of the canal, was found filling the external auditory canal. In the mastoid region there was a fluctuating swelling, which spread far up on the side of the skull. No opening in the abscess could be found. An incision high up in the swelling on the side of the head, gave vent to pus. At this point the bone was denuded and carious. The swelling was composed largely of soft granulations. After the removal of these granulations, the periosteum beneath was found normal. The bone beneath it showed wide vascular foramina. The mastoid was now chiselled open in the regular way; the bone was softened, and yellow granulations protruded from the mastoid cavity. The latter was scraped free of its granulations, but the antrum was not opened. The wound was tamponaded with iodoform gauze. In four days the burrowing abscess in the external auditory canal had gone down greatly, but it was opened, then giving vent to very little pus. In twelve days the swelling in the auditory canal had gone down, and suppuration had ceased. The perforation in the membrana had been a very small one, if any had existed; there was none to be seen now. No fever occurred after the mastoid operation. In three months after the operation the patient was dismissed with hearing of five metres for whispered words.

The third case was that of a little girl, four years old, who complained of intermittent earache during the period of desquamation after measles. A month later the ear pain became so intense that the child could not sleep, until spontaneous perforation of the membrana, with copious flow of pus, occurred. This discharge gradually diminished in the course of three weeks, when a swelling behind the ear was observed, and the child complained of feeling unwell. A month later the patient was examined by Dr. Bolt, who found the right auditory canal filled with pus, and a small perforation in the centre of the membrana tympani. In the mastoid region there was œdematous swelling and fluctuation.

A large, subperiosteal abscess was now opened, giving vent to laudable pus. The corticalis was extensively softened, and it was chiselled away. The mastoid cavity was filled with soft granulations, beneath which there was a collection of pus. Upon removal of these granulations the bony wall of the lateral sinus was destroyed at the point where the collection of pus was found. The opening in the sinus-wall was 5 mm. long by 3 mm. wide. The membranous wall of the sinus appeared normal. No irrigation for fear of

infecting deeper parts. - Iodoform tampon. By the first change of dressings the suppuration in the ear had ceased, and the perforation of the membrana had closed. Two months after the mastoid operation the wound had cicatrized, and the child could hear whispered words four metres.

Hemorrhages into the Labyrinth in Consequence of Anæmia.

Dr. J. Habermann, of Prague, reports (*Archiv f. Ohrenheilk.*, vol. xxxii. p. 82), two cases of hemorrhage into the labyrinth, one in consequence of pernicious anæmia, the other in consequence of simple anæmia. In the first instance, the patient was a young servant girl, twenty-one years old. Post-mortem, among other conditions, revealed hemorrhages into the meninges, brain, pharynx, pericardium, and small intestine, but none in the retinæ. An examination of the right auditory organ revealed neither micro- nor macroscopic changes in the middle ear. In the cochlea, however, there was a small hemorrhage in the upper end of the ligamentum spirale, in the region of the anterior periphery of the basal whorl, of the scala vestibuli, and a somewhat larger one in the basal whorl in the upper half of the canalis ganglionaris. Here the blood was between nerve-fibres and the ganglion cells. Extensive hemorrhages were found in the vestibule and in the semicircular canals; also between the ligaments of the utriculus, on the posterior wall, and on the outer wall, near the posterior edge of the stapes (oval window). Copious hemorrhage also had occurred near the mouth of the aquæductus vestibuli, and in the external semicircular canal. The extravasation of blood was supposed to be due to diapedesis. The deafness and tinnitus aurium complained of during life was referred to the hemorrhages. The vertigo could have been due to the simultaneous lesion in the brain.

The second case of labyrinth-hemorrhage, the result of simple anæmia, occurred in a young woman twenty years old. In this patient there ensued hemorrhages into the stomach, the intestines, and then the retina. Finally, there occurred hardness of hearing, tinnitus aurium, and, at times, vertigo. Treatment of the anæmia was followed by improvement in hearing.

Osseous New-growth in the Membrana Tympani.

Dr. Habermann also found an osseous new-formation in the membrana tympani, in a woman thirty years old, who had died of phthisis. The left organ of hearing being examined, it was found that the membrana tympani contained a large perforation, on the anterior edge of which there was a calcareous deposit 2–3 mm. thick and 4 mm. high. The end of the hammer-handle projected into the perforation, and the tendon of the tensor tympani was bound to the anterior tympanic wall by fibrous tissue. Microscopic investigation of the middle ear showed a thickened mucous membrane, especially at the niches where the inner passes into the lower wall. In the membrana tympani at several points were found calcareous deposits, cartilage-cells, and, at one point, *true bone-cells*, with numerous delicate offshoots into the surrounding calcified tissue. No Haversian canals and lamellæ were found.

Diagnosis, Prognosis, and Treatment of Progressive Deafness in Chronic Non-suppurative Inflammation of the Middle Ear.

This is the title of a paper read at the Tenth International Medical Congress by Prof. Gradenigo, of Turin (*Archives of Otology*, vol. xx., No. 3. Translation by Dr. J. A. Spalding, of Portland, Me.). The subject is discussed, as to prognosis, under two chief heads, viz.:

1. Whether, together with the functional disturbances which are to be referred to the conducting apparatus, there may or may not be present functional disturbances which are due to trouble in the inner ear (absence of bone-conduction for the watch, diminution of hearing for high tones, and attacks of vertigo).

2. Whether the membrana tympani is retracted or not. It can be said, on the whole, that in some forms the morbid alterations affect the membrana (hyperæmia and retraction) and the Eustachian tube, whilst in others it is the vestibular wall of the tympanic cavity (stapedial vestibular ankylosis) which has been attacked.

3. Finally, there are cases in which the inner ear has suffered.

The symptoms in the first class are, for the most part, removable, and can be improved by proper treatment, even if not entirely cured, whilst if neglected they may assume the characteristic forms of the second and third group, which are much more serious. The morbid processes in the last class have a tendency to become progressive (occasionally with great rapidity), and to lead to a degree of deafness which may in time become total. In every case the prognosis must be guarded, "because forms in the first group which improve in the first fifteen or twenty days under suitable treatment, occasionally deteriorate later, despite the continuation of the same treatment (or, perhaps, owing to the same), and pass over into those of the second or third groups."

The following is a category of the remedial plans pursued in these cases:

I. Direct treatment of the ear.

A. *From the external meatus:*

a. Massage of the ossicles (Lucæ).

b. Massage of the membrana tympani (Delstauche).

c. Surgical treatment within the tympanum (plicotomy, myringotomy, myringectomy, tenotomy of the tensor tympani-mobilization of the stapes).

B. *From the tube:*

a. Catheterization; simple air-douche.

b. Injection of atomized remedies into the tympanum by means of the catheter (sal ammoniac, ether, chloroform, iodoform, iodine, etc.).

c. Injections of liquid substances by means of the catheter into the tympanum (alkaline solutions, iodide of potassium, pilocarpine, cocaine, iodoform, vaseline).

d. Methodic introduction of celluloid bougies and massage of the tubes.

II. Local treatment of the nose (irrigation, pencilling, galvano- and thermo-cauterizations).

III. General treatment, such as iodide of potassium, arsenic, atropine, eserine, ergotine, and quinine.

IV. Electric treatment (galvanic current and interrupted current).

Excepting the surgical treatment within the tympanum, and the naso-pharyngeal treatment, it must be confessed that all of the remedies which he has catalogued the author thinks are but little more than temporarily useful. Injections into the tympanum irritate and congest the mucous membrane of the entire membrana, as can be easily seen by inspection. Constitutional treatment by such drugs as ergotine, atropine, etc., has been abandoned entirely by the author.

Basing his views upon investigations conducted by himself and Professor Maggiora, the author furthermore concludes "that at least atrophic and sclerotic forms of catarrhal inflammation of the middle ear are quite independent of the influence of pathogenic microörganisms. These conclusions have been strengthened by the fact that an antiseptic treatment of the disease in question was useless in the experience of Gradenigo. The views of the latter as to the best manner of treatment of chronic catarrh of the middle ear may be summed up as follows: "Since chronic catarrhal affections of the middle ear, in general, are connected with peculiar pathological alterations in the mucous membrane of the naso-pharynx, we ought, instead of resorting to antiseptic measures, to try such as may influence the vitality of the tissues affected."

But all cases must be carefully studied for themselves and their peculiarities. Patients who are not benefited by long-continued direct treatment of the external ear and injections into the tympanum, obtain relief from careful treatment of the naso-pharyngeal mucous membrane.

Injurious Effects of the Telephone upon Hearing.

Gellé, of Paris, observes that those who frequently use the telephone sometimes present a series of aural disturbances similar to those resulting from the continued action of loud noises. In such cases there may be found inflammation of the membrana tympani and of the tympanic cavity, or there may be irritable conditions of the nervous apparatus of the ear, exercising an influence upon the general nervous system. Hence, in the cases observed, there were pains in the ear, diminished hearing, subjective noises, hyperæsthesia acoustica, and vertigo, all of which were manifested at first during loud auditory impressions, but later became permanent, with general nervous irritability. Probably, for the production of the aforesaid disturbances, there must be a certain predisposition, due either to a greater excitability of the entire nervous system or a previous and still existing disease of the auditory organ.—*Annales des Maladies de l'Oreille*, No. 12.

OBSTETRICS.

UNDER THE CHARGE OF

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A Successful Cæsarean Section.

T. Gaillard Thomas reports a successful Cæsarean section (*Medical Record*, 1892, vol. xli., No. 20, p. 534), performed upon a dwarf at ten months of gestation. The true conjugate was two and five-sixths inches; the spine was straight, and the long bones well formed. The patient was a primipara, and the operation was done when dilatation was partly complete. Under thorough antisepsis, a long incision was made, and three silk sutures passed at the upper extremity of the incision, and left untied. The uterus was lifted out of the abdomen, and wrapped in a moist antiseptic towel in the hands of an assistant. A large flat sponge was placed over the intestines, and the abdominal walls closed over it by the three sutures. An elastic tubing was placed round the cervix, and a single knot made in it without constriction. A small sponge was put in the lower angle of the wound, and the point of exit of the uterus from the abdomen was protected by moist antiseptic towels and gauze. The uterus was opened by a bistoury, and then by scissors. The child was delivered, the cord secured by clamps, and severed, and the placenta detached without effort, and completely. Slight hemorrhage was stopped by the cervical ligature. The uterus was cleansed with a sponge, and the cavity dusted with iodoform. The uterus was closed with deep sutures of silk, three to an inch, extending down to the mucosa, and with intervening, superficial, silk sutures, one to every interspace. After the uterus had been returned to the abdomen, the peritoneal cavity was sponged out, the omentum drawn down over the uterus, and fluid extract of ergot injected into the patient's thigh. The abdominal wound was closed with silkworm-gut, an ordinary antiseptic dressing applied, no food or drink allowed, but morphine hypodermatically was administered three times during the night. The child was a male, weighing ten pounds fifteen ounces; the occipito-frontal diameter of its head measured five inches.

Thomas prefers chloroform to ether, for Cæsarean section; he would operate during the first stage of labor; he frankly admits that he should not feel warranted in performing laparo-elytrotomy in view of the present success of Cæsarean section.

Uterine Mole Complicated by Hemorrhage, Terminating in Recovery.

Warman (*Centralblatt für Gynäkologie*, 1892, No. 19) reports the case of a multipara suffering from severe hemorrhage and collapse. The prompt use

of stimulants resulted in reaction; the uterus was as large as at five months. Evidences of the existence of a fœtus were wanting. Examination revealed a mass in the uterus resembling a placenta in placenta prævia. A watery fluid, with abundant mucus, came from the uterus after examination. Uterine contractions were strong. As the mother's condition did not warrant radical interference, an iodoform-gauze tampon was applied, and eight hours afterward a large uterine mole was expelled. Neither fœtus nor placenta could be found in the mass. The tumor and its fluid occupied a measure holding four and a half quarts.

The Treatment of Uterine Mole.

Fritsch (*Ibid.*), in remarking upon the above case, describes his treatment in his own practice, and considers active interference strongly indicated. He employs the curette as soon as possible, as the safest and most efficient means of checking the hemorrhage and terminating the case.

Death from Retroflexed and Incarcerated Uterus.

Treub (*Nederl. tijdschr. v. Verlosk en Gynäkol.*, Jahrg. iii., No. 3) reports a fatal case of incarcerated, pregnant uterus. The post-mortem revealed gangrene of the colon, followed by acute peritonitis. He has collected fifty cases of death from this cause, and in none of them, except his own, was gangrene of the intestine a cause; 13 perished of uræmia, 11 of rupture of the bladder, 6 of sepsis, 10 of peritonitis following cystitis, 3 of pyæmia, 2 of rupture of the peritoneum, and 5 of accidents accompanying an effort to replace the uterus. Gangrene of the intestine is, therefore, an unusual cause of death in this condition.

A Tubal Abortion.

An interesting case of tubal abortion is reported by Renteln at the Evangelic Hospital, St. Petersburg (*St. Petersburger medicinische Wochenschrift*, 1892, No. 16). The patient was a primipara, pregnant between three and four weeks. Her symptoms were those of abdominal pain, giddiness, and flooding. These increased in severity in spite of rest and opium. The patient's condition finally necessitated active stimulation, and four days after she was taken ill, examination revealed a tumor at the left side of the uterus as large as a hen's egg. There were also some thickening and indistinct fluctuation on the left side. A diagnosis was made of tubal abortion from the left tube. The patient was brought into a hospital, placed in Trendelenburg's posture, and anæsthetized with chloroform. Abdominal section confirmed the diagnosis. The sac was found above the left ovary, and a pedicle of considerable length could be made from a fold of the broad ligament. The sac was accordingly removed, and the ovary left. Blood and clots were sponged out of the abdomen, and it was closed without drainage. Examination of the specimen revealed the sac of a tubal pregnancy as large as a hen's egg; ligated and removed. The ovum was as large as a walnut, and the beginning

of a placenta and the embryo could be distinctly made out. (A recent case operated upon by the writer was a tubal abortion which had occurred four weeks before the operation. The physician in attendance supposed the abortion to have been intra-uterine; a large sac was found full of blood-serum and clot, with the débris of an embryo of a few weeks' development. The patient was a healthy woman, and survived the abortion after spending two weeks in bed. The cavity in this instance was cleansed by an aseptic sponge, and packed with iodoform gauze. Its gradual obliteration, and the recovery of the patient, followed.)

Puerperal Tetanus.

In the *Archives de Tocologie*, 1892, No. 3, Vinay reports the case of a multipara, aged thirty-six years, who suffered from abortion during the second month of her fourth pregnancy. She had hemorrhage for several days, and did not know the exact time of the abortion. No interference was practised at the time; the lochia shortly afterward became foul, and the uterus was curetted under chloroform anæsthesia. Portions of retained membrane, decomposed, were removed, and an hour afterward the patient had a violent chill. The second day after the curetting she suffered from pain in the masseter muscles; trismus and spasm of the pharynx with difficult deglutition soon followed. The general symptoms of tetanus rapidly supervened. The pulse was 108, the temperature $98\frac{5}{10}°$. Thirty-six hours after the appearance of the first symptoms the patient died. No autopsy was obtainable. Vinay has collected 106 cases; 47 of these occurred after abortion, 59 after parturition at term. The first three months of pregnancy is the most susceptible period, and the patient during the first half of pregnancy is in much greater danger of tetanus than subsequently. Tetanus most frequently follows some minor manipulation, and hence comparatively few of the cases occur in maternity hospitals, as most of them are treated at their homes. Artificial delivery occurred in most instrumental cases, and next in frequency was the use of the tampon; the forceps and version do not predispose to tetanus, while Vinay could find but one case of craniotomy so complicated, and but one case of Cæsarean section. Multiparas above the average age are most often attacked. The most important influence in predisposing to tetanus is the wretched surroundings of patients who suffer from it, and especially living in damp and squalid lodgings. There seems reason to believe that trismus may be conveyed by contagion, as in a case reported by Henricius. Amon also reports a case of artificial delivery of a placenta, where he seemed to convey the poison of tetanus from the wounded hand of the husband, which he had dressed, to the mother's uterus. Tetanus is also most frequent in the tropics, where the condition of the soil seems favorable for the development of telluric bacteria.

Puerperal tetanus usually develops during the first week after labor, and becomes acute or chronic. The prognosis is doubtful, and usually hopeless. Out of 106 cases, 94 proved fatal, a mortality of $88\frac{67}{100}$ per cent. The mortality of abortion complicated by tetanus is 1 per cent. greater than that of labor at term under similar circumstances. The diagnosis may be doubtful in cases of severe hysteria; in prophylaxis, the employment of antiseptics

and the precaution that a physician attending a tetanus patient should not attend confinement cases, will be sufficient. The treatment consists in antisepticizing thoroughly the genital tract, and in the employment of sedatives. Prophylactic inoculations with cultures of the bacillus of tetanus have not yet been extensively employed.

GYNECOLOGY.

UNDER THE CHARGE OF

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Pneumococci in the Pus from a Pyosalpinx.

Frommel (*Centralblatt für Gynäkologie*, 1892, No. 11) reports the following case: The patient, aged thirty-eight years, had a tuberculous disease of the left apex at the age of twenty-three, and later Pott's disease. She had aborted seven times. Laparotomy was performed for pyosalpinx on the right side; during the operation pus escaped into the cavity and the patient died of septic peritonitis on the third day. At the autopsy no old changes were found in the lungs. Bacteriological examination of the pus from the tube revealed the presence of microörganisms exactly resembling Fränkel's pneumococci, which retained their virulent properties in pure cultures, animals inoculated with them rapidly succumbing. Fränkel himself confirmed the diagnosis.

Aside from the interest attaching to the unusual presence of these cocci in a pyosalpinx, is their extreme virulence toward the peritoneum, although none were found in the cavity after death. Since the autopsy was not performed for forty-eight hours, it is quite probable that they were originally present and were destroyed post-mortem. How they entered the tube it is impossible to say. Neither in this case, nor in a similar one reported by Zweifel, was any pneumonic process found in the lungs. They must have been in the air and found access to the genital tract through the vagina in the same manner as other ubiquitous organisms.

Strangulated Hernia of the Ovary.

Maylard (*British Med. Journal*, April 9, 1892) reports the following interesting case: A maiden lady, aged seventy-five years, had been troubled with a swelling in the left groin for three years, of unknown origin. The only symptoms to which it gave rise were urinary, but these were entirely relieved on assuming the dorsal posture, when the tumor disappeared. On one occasion it came down and could not be reduced as usual. It became tense, the skin over it was reddened, and there was considerable local pain.

When examined by the reporter, five days later, it was quite tender; but, although situated at the usual site of a femoral hernia, no impulse was obtained on coughing, the bowels were open, and there was no vomiting or general disturbance. The attending physician had made the diagnosis of strangulated hernia of the ovary. A week later the tumor was larger and there was a slight rise of temperature, but no serious symptoms had appeared. An incision was made as for femoral hernia and the tumor was peeled out of a sac to which it was adherent. The patient made a good recovery. A microscopical examination of the growth showed that it was an enlarged ovary containing a large blood-clot.

The writer states that from a careful review of the literature of the subject he finds his case to be unique, as regards not only the age of the patient, but the location of the hernia. Nearly all the recorded cases have been those of inguinal strangulation, usually associated with bowel or omentum. The only symptom in the case cited—reflex vesical irritation—has not been previously noted.

An Unusual Form of Secondary Carcinoma of the Uterine Body.

Benckiser (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band xxii., Heft 2) found, in a uterus removed *per vaginam* for cancer of the cervix, that the disease had extended above the os internum, the corporeal endometrium being traversed by deep furrows between which were opaque reddish nodules. On microscopical examination the epithelium was seen to be normal in the furrows, while over the nodules the epithelial cells were enlarged and contained large transparent nuclei, while the mucosa was infiltrated with round cells. A few glands still retained their epithelial lining. A small fibrous polypus at the fundus had undergone cancerous degeneration. It was evident that the secondary disease in the corpus uteri had affected only the superficial epithelium, the glands and connective tissue being healthy. The patient being fifty-nine years of age, the absence of glands might be explained as due to climacteric changes. The patient was free from recurrence two years after operation.

The Causes of Recurrence after the Removal of Cancer.

Winter (*Centralblatt für Gynäkologie*, 1892, No. 11) states as the result of extended observations that if cancer is limited to the uterus, so far as can be ascertained at the time of operation, it is seldom that the lymph-glands are already affected. Metastasis in the viscera are rare, since he noted only 7 cases out of 123. Local recurrence is most common. Of 230 women whose uteri had been removed for cancer, this was observed in 50 per cent. After total extirpation for commencing epithelioma of the cervix, extensive infiltration of the perimetric tissues appears due, not to the growth of diseased nodules which have been left behind originally, but to infection of healthy tissues during the operation. The following arguments are advanced in favor of this theory: 1. Cancer of the cervix, if not touched, is accompanied by only moderate thickening of the parametria, especially posteriorly, while after operation the induration becomes more marked and

general. 2. Recurrence from non-removal of all the diseased tissue occurs in the cicatrix and extends outward, while recurrence from infection during operation may result in extensive pelvic induration while the cicatrix remains unaffected. 3. The latter occur so quickly and universally that they cannot be attributed to the growth of isolated foci. 4. They are observed only in those cases in which cancerous matter has been allowed to come in contact with a healthy wounded surface. 5. Those forms of cancer which develop in the cervical or corporeal mucous membrane allow a better prognosis than does extensive disease of the portio, because in the former case infection can be prevented by care during the operation, the uterine cavity being previously disinfected and the os sutured; in the latter, the use of the sharp spoon, followed by the Paquelin cautery, will do much to lessen the danger.

The Association of Carcinoma Uteri with Fibro-myoma.

Schramm (*Centralblatt für Gynäkologie*, 1892, No. 12) is somewhat sceptical regarding the alleged frequency with which carcinoma and fibro-myoma occur in the same specimen, since he has been able to find only nine authentic cases in the literature of the last five years. He denies that a uterine fibroma ever undergoes cancerous degeneration. The development of a cancerous nodule in the corpus uteri in the vicinity of the benign growth may be regarded as the result of chronic congestion and endometritis induced by the latter; between cancer of the cervix and myoma there can be no causal relation, their simultaneous occurrence being purely accidental.

[The writer's search through the literature must have been confined to papers in his own language. We have examined three or four specimens of carcinoma and fibro-myoma associated in the same specimen, presented at the New York Obstetrical Society during the past three years.—H. C. C.]

A Rare Form of Fibro-cyst of the Uterus.

Matlakowsky and Przewoski (*Gazeta Lekarska; Centralblatt für Gynäkologie*, 1892, No. 12) describe the minute anatomy of an interesting fibro-cystic tumor, which they regard as a unique specimen of *cavernous lymphangioma*. The patient, aged thirty-four, had suffered for several years from dysuria and temporary enlargement of the abdomen after every menstrual period. From eight to ten days after the cessation of the period she would have a gush of clear fluid from the vagina, with a simultaneous decrease in the size of the tumor, so that it could hardly be felt above the pubes. These facts were positively established by repeated examinations. Supra-vaginal amputation was performed successfully, and the tumor was carefully examined. It had originated through primary enlargement of the lymphatics within the normal uterine tissue, followed by disappearance of the muscular substance and expansion of the connective tissue. The interior of the mass consisted of a network of fibres, the interstices of which were filled with serous fluid, that had escaped into the uterine cavity every month by an actual rupture of the enclosing wall, the opening subsequently closing. Unlike the condition in ordinary fibro-cysts, the ectasia of the

lymphatics was primary and did not occur in a preëxisting fibro-myoma, as described by Leopold and others.

Pregnancy and Ventro-fixation.

Fraipont (*Annal. de la Soc. Méd.-chir. de Liège*, 1892, No. 4) reports seven cases of ventro-fixation by Winiwarter and himself, three of the patients, who were married, becoming pregnant soon after operation, although one of these had a small ovarian cyst and two a cystic ovary. In each instance the diseased ovary was removed and the fundus uteri was attached by deep sutures including the edges of the abdominal wound. One woman was delivered at term, another at seven and one-half months, in consequence of an accident, the child living; the third bore a living child at the eighth month. All the patients complained of severe pains in the cicatrix between the third and fourth months of pregnancy, which were absent in the latter half. Labor was normal in each instance. In one case only the uterus was found to be retroverted after delivery. It is doubtless desirable that pregnancy should not occur so soon after the operation, since the adhesion is at first quite firm, but later becomes more cord-like and distensible, allowing the uterus to rise out of the pelvis, while preserving its normal position.

The Palliative Treatment of Carcinoma Uteri with Alcohol.

Schultz (*Centralblatt für Gynäkologie*, 1892, No. 13) reports ten cases of cancer of the cervix uteri treated by injections of alcohol. He uses absolute alcohol, injecting from one to two cubic centimetres at one sitting. In one case forty-eight injections were made at intervals of a day or two. There is little pain, provided that the needle is plunged deeply into the diseased tissue. Most of the alcohol escapes after withdrawing the needle, bringing away with it broken-down tissue. In the cases reported the treatment resulted in diminution of the diseased area, with the gradual formation of healthy epithelium over it. Hemorrhage and foul discharge ceased and there was a notable improvement in the patient's general health.

The Influence of Pelvic Diseases on the Voice.

Klein (*Journ. Am. Med. Assoc.*, 1892, No. 16) says that during menstruation women are prone to inflammation of the tonsils and larynx, and that he has observed in singers at this time that the voice often becomes hoarse and deep, assuming a masculine tone, so that one who is accustomed to noting the difference can tell when they are menstruating.

In many cases of ovarian disease he has observed hypertrophy of the tonsils and uvula; as in eunuchs, there appears to be an intimate relation between the voice and the sexual organs.

The Influence of Peritonitic Adhesions on Parturition.

Holowko (*Zeitschrift für Geb. u. Gynäkologie*, Band. xxi., Heft 2) reports an interesting case which he believes illustrates a possible danger attending labor after ventro-fixation of the uterus. A woman in the eighth month of

pregnancy on making a sudden movement was seized with a severe pain in the abdomen, which became rapidly worse and was attended with symptoms of general peritonitis. She was delivered spontaneously, but died an hour after. At the autopsy a quantity of blood was discovered in the peritoneal cavity, which had escaped from the rupture of adhesions between the ascending and transverse colon. There were no evidences of sepsis.

Chancre of the Cervix Uteri Mistaken for Epithelioma.

Pichevin in a clinical lecture (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1892, No. 2) showed an interesting case, in which an ulceration of the cervix uteri had been diagnosticated as commencing epithelioma and cauterized. The marked induration of the cervix and the general decline of the patient's strength seemed to confirm the diagnosis, and hysterectomy was advised. On being admitted to the hospital she was examined by Pichevin, who found an irregular superficial ulceration of the posterior lip, with everted edges and a hard base. The anterior lip was of normal appearance and consistence. Although the diagnosis of epithelioma was regarded as highly probable, it was thought advisable to keep the patient under observation, and to excise a bit of tissue for microscopical examination before performing a radical operation. A few days later she developed a characteristic syphilitic roseola. The true condition had been masked by the cauterization.

[This instructive case seems to present an argument against the premature resort to total extirpation at a stage when there is still a reasonable doubt as to the presence of malignant disease. A less cautious surgeon might have operated successfully and reported the case as a permanent cure—a source of error which we ought to bear in mind in considering the statistics of the operation.—H. C. C.]

Vaginal Hysterectomy for Carcinoma.

At a recent discussion of this subject at the Surgical Society of Paris (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1892, No. 2), Borilly reported fifty cases of total vaginal extirpation, with a mortality of 32 per cent. Six patients had remained well, one for four years; in all the others there had been a recurrence within from two to twelve months after the operation. In fifteen cases of amputation of the cervix an early recurrence was noted in every instance.

Richelot stated that he had followed the suggestion of Verneuil to institute a comparison between the results of high amputation and total extirpation, by performing the operations upon two series of cases under similar conditions; he had found that recurrence occurred much earlier after the partial operation. He emphasized the fact that when the disease was apparently limited to the cervix, secondary nodules were found in the corpus uteri, and reported illustrative cases.

Marchand affirmed that hyperplastic endometritis was a common accompaniment of cancer of the cervix, and might be mistaken for malignant disease of the corporeal endometrium.

Endothelioma of the Ovary.

Rosthorn (*Archiv für Gynäkologie*, Band xli., Heft 3) describes and figures the appearances observed in microscopical sections of so-called endothelioma, which he regards as a true neoplasm, favoring the term "sarcoma perivasculaire" applied to it by Ackermann. He thinks that capillary stasis is doubtless an etiological factor in its development. Several forms of endothelioma may be distinguished according to their mode of origin and the prevailing histological structure.

[It is hardly necessary to call the attention of the reader to the original work of American observers—Jones, Boldt, and more recently Foerster. All agree regarding the histological peculiarities of this interesting condition, and its close resemblance, anatomically at least, to a malignant neoplasm. Unfortunately, its true importance from a clinical standpoint has not yet been definitely settled. It is highly desirable to know, not only if it is possible to recognize at the examining-table an ovary which is the seat of endothelioma, but also if it gives rise to symptoms different from those of ordinary chronic oöphoritis, which form a more urgent indication for prompt removal by laparotomy.—H. C. C.]

Lipoma and Fibroma of the Fallopian Tube.

Parona (*Ann. di Ostet. e Gin.*, 1892, No. 2) in removing the adnexa for the cure of uterine fibro-myoma, encountered a lipoma the size of a pear, from which was pendent a normal ovary. The tube was so imbedded in the tumor that only the fimbriated end was visible. It apparently developed from one of the fimbriæ.

Spaeth (*Zeitschrift für Geb. u. Gyn.*, Bd. xxii., Heft 2) reports the case of a patient from whom he removed a tube which contained a true interstitial fibro-myoma imbedded in its wall at a short distance from the uterine end. There were no evidences of chronic inflammation in the tube, so that it could not have been a case of so-called pachysalpingitis.

Endometritis in Acute General Diseases.

Massin (*Archiv für Gynäkologie*, Bd. xl., Heft 1) examined twelve uteri from fatal cases of typhoid fever, pneumonia, etc., and found acute interstitial inflammation of the muscular wall, as well as of the endometrium, with superficial hemorrhages, the latter being most extensive in connection with continued fever. They were apparently due to venous stasis. The glands showed cloudy swelling and granular degeneration of the epithelium, with hemorrhages into the lumen.

Associated Streptococcus Infection of the Vermiform Appendix and Fallopian Tube.

Robb (*Bull. Johns Hopkins Hospital*, 1892, No. 20) reports at length a fatal case of this character, calling attention to the following points: The vermiform appendix was adherent to the right ovary and tube, and both in the tube and in the appendix were found streptococci pyogenes. Death was imme-

diately due to hemorrhage from a recent duodenal ulcer (due to cauterization of the stump of the appendix?). As the cocci were not found in the left tube, there seemed to be good reasons for inferring that the infection extended directly from the intestine to the tube.

The writer concludes that in the presence of such virulent organisms drainage is practically useless.

PÆDIATRICS.

UNDER THE CHARGE OF

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A Case of Retro-pharyngeal Lymphadenitis Requiring Tracheotomy.

Bokai (*Jahrbuch für Kinderheilkunde*, 1892, Band xxxiii., Heft 3, p. 360) reports a case of retro-pharyngeal lymphadenitis in a child eight months old, in which tracheotomy was necessitated by the supervention of alarming symptoms of suffocation. The posterior wall of the pharynx showed diffuse, hard swelling without fluctuation, and a deep incision into the mass had yielded no pus. After the tracheotomy the threatening symptoms were relieved and resolution was quickly established, the tube being removed at the end of three days. The case is interesting in view of the gravity of the symptoms caused by a simple adenitis, and also for the success achieved by tracheotomy. Contrary to the statements of some writers, Bokai finds that in both lymphadenitis and retro-pharyngeal abscess tracheotomy is rarely indicated. In an experience of 400 cases of abscess observed in the Pester Kinderspital, tracheotomy was not required in a single instance; and among 112 cases of simple retro-pharyngeal lymphadenitis, not one presented such grave symptoms as did this case. The success of tracheotomy in a child only eight months old also shows that this operation, under appropriate conditions, is not contra-indicated by an age under one year.

Mammary Abscess in the Newborn Infant.

Comby (*La France Médicale*, 1892, No. 9, p. 138) records three cases of suppuration of the mammary gland in newborn infants. One of these was quite grave, for a small abscess opened by a careless midwife was followed by a lymphangitis and an adeno-phlegmon of the axilla. Such abscesses, he believes, are usually the result of unskilful or inopportune treatment of the

gland during the period of physiological engorgement, which occurs to some degree in most infants during the first few days after birth. Squeezing or sucking, which is the usual practice among ignorant nurses, frequently infects the excretory canals or the gland itself, thus giving rise to suppurations that may destroy all future usefulness of the organ. The treatment should consist simply of an aseptic protection of the gland with absorbent cotton or the plaster of Vigo.

The "Osteo-arthropathie Pneumique" of Marie.

It has been so short a time since Marie called attention to the group of symptoms to which he gave the name osteo-arthropathie pneumique, that as yet little light has been shed upon the obscure etiology and pathology of the disease, if indeed it can be considered other than a variety of acromegalia, as Arnold believes it to be. Lefebvre, in his exhaustive thesis on this subject which appeared last year, collected twenty-five cases reported to date. From the fact that almost, if not quite, all these cases occurred among adults, he draws the conclusion that adult life seems to be a necessary condition to the development of the disorder; and states, in addition, that his researches in the children's hospitals, despite the frequency of purulent pleurisy in childhood, were without result. Later observations, however, tend to show that children are not exempt from this peculiar affection. Moussous has reported (*Journal de Médecine de Bordeaux*, Oct., 1890, Nos. 10 and 11) a case occurring in a girl of fourteen years, following a purulent pleurisy; and Bailly, in 1862, recorded changes in the fingers and toes of a child ten years old, as a sequel of pleurisy.

The most recent contribution to the subject is found in an interesting paper by Gillet (*Annales de la Policlinique de Paris*, 1892, No. 3, p. 93), who reports two cases occurring in children.

In the first patient, a boy of twelve and three-quarter years, marked changes had existed since the age of six years, attending a condition of emphysema and bronchial dilatation, beginning at the age of four years. There were well-marked lesions of the fingers, toes, and malleoli, with decided dwarfing of bodily growth, slight flattening of the superior frontal regions, slenderness of the shafts of the long bones, and bad teeth. Growth seemed to have stopped at six years of age, and, while the boy was as intelligent as his schoolmates, he had the height and frame of a boy of six years.

The second observation concerned a girl of seven years, suffering from pulmonary tuberculosis and empyema, who showed increased size of the distal phalanges of the fingers and great toes, with the characteristic curving of the nails. After the cure of the empyema the deformations almost entirely disappeared, though the tubercular disease of the lung continued its course. It is noteworthy that this regression occurred also in the very similar case reported by Moussous; both of them occurring with an empyema. It is, therefore, evident that osteo-arthropathie hypertrophiante pneumique may occur in childhood; that the lesions do not seem to invade so many bones as in adult cases; that these deformations may be recovered from; and that the same cause may produce coincidently an arrest of development and also

trophic disturbances, either directly, or indirectly by an injurious action upon the entire organism.

The Systolic Bruit of the Fontanelle.

In an inaugural thesis (*Ueber die Pulsation und das systolische Geräusch der Fontanelle*, Halle, December 8, 1891) Ernst Winckler presents a comprehensive study of the so-called systolic brain murmur, first remarked by Fisher, of Boston, in 1833. An examination of more than six hundred children has furnished fifty cases which presented this symptom. This bruit is blowing in character, is always synchronous with the cardiac systole, and is quite markedly intermittent just before its disappearance. Its seat of maximum intensity is at the fontanelle, but it may sometimes be perceived in all the regions of the cranium. No connection exists between its intensity and the size of the fontanelle, but there are variations of intensity in the same subject without appreciable reason. When he was able to auscultate the carotid, the author has detected a bruit—a fact which tends to confirm the carotid origin of the murmur, as is held by Roger, Steffen, and Epstein, of Prague.

Eighteen of the fifty observations were in perfectly healthy children, while the remaining cases were found in children suffering from rhachitis, pseudo-leukæmia, diphtheria, furunculosis, and various acute inflammations of the respiratory or gastro-intestinal mucous membranes. It is, therefore, evident that no pathognomonic importance can be attached to this phenomenon. As to its pathogeny, the author thinks that a venous origin cannot be accepted; nor can the theory of compression of the artery, in the carotid canal (Jurasz), or by enlarged cervical glands (Epstein), be held for all cases. He believes that this murmur is due to sudden changes in arterial tension, such as occur in aortic insufficiency; basing this opinion upon the character of a number of sphygmographic tracings, which he obtained from his patients, and in which he has found a resemblance to the characteristic tracings of the Corrigan pulse.

In addition to this, the administration of digitalis to some healthy children presenting the murmur caused a disappearance of the sound by regulating and raising the tension; and, again, the lowering of tension produced by fever provoked the appearance of a bruit previously absent.

These observations indicate that the systolic brain murmur is spontaneously produced in the great arteries of the base, being dependent upon conditions in the child favorable to the production of arterial murmurs, and upon the coincidence of a fall in tension and arterial pressure with an energetic cardiac action. It is, therefore, evident that this murmur will be encountered in diverse diseases, whenever the determining conditions present themselves. With healthy children it should not be considered absolutely normal, but as slightly pathological, and requiring some watchful attention. The time at which this murmur can be heard (three to five months to three to five years) corresponds to the time when the arteries are not very resisting, are proportionally larger than in later life, and very poor in elastic fibre. These conditions favor the production of the phenomenon. It is

probably for this reason, as Epstein has observed, that the bruit of the fontanelle is so often observed in rhachitis.

The Etiology of Aphthous Stomatitis.

Ollivier (*Revue Mensuelle des Maladies de l'Enfance*, 1892, No. 1, p. 11) adduces some new observations in support of the view that the milk of cows and goats suffering from aphthous fever is capable of producing an aphthous stomatitis in persons who drink it. He does not deny that aphthæ may result from a simple herpetic eruption or from a local irritation; but he insists that distinct manifestations follow the drinking of infected milk. This view was originally suggested in 1765, by Sagar, who observed an epidemic of the disease among the monks of a Franciscan convent, where the principal article of diet was milk derived from a herd of cows at the time affected with aphthous fever. The observations of other writers, which tend to further corroborate this view of the etiology of the disease, are discussed in detail. Bacteriological studies by Fränkel have shown the presence of the staphylococcus pyogenes citreus of Passet and the staphylococcus of Rosenbach; but neither of these organisms has a specific importance. In man, and especially in the case of children, the disease is not absolutely without danger. Demme has reported one fatal case, and Fränkel records three or four. Prophylactic measures are, therefore, important; and when several cases occur among a number of children fed upon milk from a common source of supply, the milk should be well boiled; or, better, perhaps, a new dairy should be sought.

Two Cases of Acute Nephritis Following Eczema.

Decio Felici (*Arch. Ital. di Pediatria*, March, 1892) records the cases of a brother and sister, the former six and the latter twelve years of age, who for some time had been affected with an impetiginous eczema of the face. The parents had attached no importance to the eruptions, and had sought no medical aid. The author was called in to see the children because of the supervention of œdema of the face and extremities, dyspnœa, bronchitis, and oliguria. Albumin and tube-casts were found in the urine of both children. The girl was very ill and died in coma following convulsions. The boy happily recovered. The author believes that the eczematous patches had served as a port of entry for some pathogenic germs which had been carried finally to the kidneys and there set up acute inflammation. The surface covered by the eruption was too limited to warrant the theory of reflex irritation or suppression of the functional activity of the skin.

The So-called Fever of Growth.

Barbillion (*Revue Mensuelle des Maladies de l'Enfance*, January, 1892, p. 1) draws the following conclusions, among others, in regard to the so-called fever of growth: 1. The fever of growth does not exist as a morbid entity. 2. Growth cannot determine fever any more than can pregnancy, the establishment of puberty, or senile involution. 3. The phenomena which have been grouped under the head of "growing fever" are due to various causes;

some are febrile states more or less clearly characterized (ephemeral fever, the fever of fatigue, gastric derangements, mild acute articular rheumatism, mild attacks of typhoid fever, intermittent fever, etc.); others are attenuated forms of acute osteomyelitis. 4. Epiphyseal pains may be observed in young subjects in any febrile condition. 5. Notable growth of the body may show itself as a sequel of any disease of childhood or adolescence, whether acute or chronic. 6. It is therefore impossible to establish a group of symptoms not constituted by the artificial association of dissimilar cases.

Microörganisms in the Healing Umbilical Cord.

Cholmogoroff (*Zeitschrift f. Geburtshülfe u. Gynäk.*, B. xvi. H. 1) gives the results of bacteriological examinations undertaken to test the most efficient and antiseptic dressing for the umbilical cord. In all cases, cultures from the freshly cut cord, immediately after birth, showed the absence of microorganisms. The next series of observations was made upon cords dressed simply with absorbent cotton. The ligature-thread was sterilized with bichloride (1 per cent.) solution, and, after the whole body and cord were washed with soap and water, the navel was dressed with water and absorbent cotton, the dressing being changed three or four times daily. In all of seventy cases there was found the staphylococcus albus in great numbers, the staphylococcus aureus less numerously, and still less so the staphylococcus citreus; while in several instances a few colonies of the staphylococcus pyogenes, besides the sarcina lutea and the bacillus subtilis, were observed. Essentially the same results were obtained from cultures of cords dressed with lanolin. In a third series of cases, dressed with gypsum, in some the navel being washed once daily with soap and water, in others lime-water being employed as a lotion, it was found that while the development of the non-pathogenic organisms was not interrupted, the growth of the pathogenic microbes was very markedly prevented. Under the gypsum dressing the mummification of the cord took place much more rapidly than under any other dressing.

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